FLOOD CONTROL, RIVERS AND HARBORS—MISCELLANEOUS PROJECTS

HEARINGS

BEFORE A

SUBCOMMITTEE OF THE COMMITTEE ON PUBLIC WORKS UNITED STATES SENATE

EIGHTY-FOURTH CONGRESS

FIRST SESSION

ON

S. 414

A BILL AUTHORIZING A PRELIMINARY EXAMINATION AND SURVEY OF THE NEW ENGLAND, NEW YORK, LONG ISLAND, AND NEW JERSEY COASTAL AND TIDAL AREAS

S. 524

A BILL TO AUTHORIZE AND DIRECT A FULL INVESTIGATION OF THE PROBLEM OF PROTECTING NARRAGANSETT BAY AND THE SOUTHERN SHORES OF NEW ENGLAND FROM HURRICANE TIDAL FLOODS

S. 1069

A BILL TO INCREASE THE AUTHORIZATION FOR THE COLUMBIA RIVER AT BONNEVILLE, OREG.

AND OTHERS

APRIL 18, 19, 20, 21, 1955

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FLOOD CONTROL—RIVERS AND HARBORS MISCELLANEOUS

MONDAY, APRIL 18, 1955

UNITED STATES SENATE,
COMMITTEE ON PUBLIC WORKS, SUBCOMMITTEE ON
FLOOD CONTROL, RIVERS AND HARBORS,
Washington, D. C.

The subcommittee met at 10:15 a. m., in Room 412, Senate Office Building, Senator Robert S. Kerr (chairman of the subcommittee) presiding.

Present: Senators Kerr (presiding), Gore, Symington, Thurmond, Neuberger, Case, and Cotton.

Senator KERR. We will consider today S. 15, and S. 1340, S. 1069, and S. 1070.

(The above-mentioned documents are as follows.)

[S. 15, 84th Cong., 1st sess.]

A BILL To convey by quitclaim deed certain land to the Brownville Navigation District of Cameron County, Texas

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the Secretary of the Army is hereby authorized to reconvey, by quitclaim deed, to the Brownsville Navigation District of Cameron County, Texas, for a monetary consideration of equal to that paid by the United States to such district therefor, for public park and recreational purposes only, those lands located on Brazos and Padre Island, Cameron County, Texas, including accretions thereto, which were conveyed to the United States by the Brownsville Navigation District by two deeds, both dated October 25, 1932, and recorded in volume 243, pages 260–262, and volume 244, pages 101–103 of the deed records of Cameron County, Texas, except for such portions of the lands or interests therein as the Secretary of the Army may determine are needed in connection with river and harbor improvement works at the location and under such terms and conditions as the Secretary of the Army, with the concurrence of the Secretary of the Treasury, shall determine advisable to assure that the use of the land for park purposes will be compatible with the operations of the United States Coast Guard and the construction, maintenance, and operation of the river and harbor project and such additional terms and conditions as he shall deem advisable in the public interest: *Provided, however*, That the Brownsville Navigation District shall first furnish assurances satisfactory to the Secretary of the Army that the United States Government, its employees, agents, and contractors shall have the right to utilize the existing causeway, constructed by Cameron County, Texas, for access to Padre Island, Texas, in connection with governmental activities without charge.

The conveyance authorized by this bill shall not pass any right, title, or interest in fissionable materials.

In the event said property shall cease to be used for public park and recreational purposes for a period of two successive years, then title thereto shall immediately revert to the United States.

[S. 1340, 84th Cong., 1st sess.]

A BILL To authorize the conveyance by quitclaim deed of certain land to the Brownsville Navigation District of Cameron County, Texas

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the Secretary of the Army is hereby authorized and directed to reconvey, by quitclaim deed, to the Brownsville Navigation District of Cameron County, Texas, for a monetary consideration equal to that paid by the United States to such district therefor, all right, title, and interest of the United States in and to those lands located on Brazos and Padre Island, Cameron County, Texas, including accretions thereto, which were conveyed to the United States by the Brownsville Navigation District by two deeds, both dated October 25, 1932, and recorded in volume 243, pages 260–262, and volume 244, pages 101–103 of the deed records of Cameron County, Texas, except for such portions of the lands or interests therein as the Secretary of the Army may determine are needed in connection with river and harbor improvement works at the location.

SEC. 2. The conveyance authorized by this Act shall contain such terms and conditions as the Secretary of the Army, with the concurrence of the Secretary of the Treasury, determines advisable to assure that the use of the land by the Brownsville Navigation District or its transferees will be compatible with the operations of the United States Coast Guard. Such conveyance shall also contain such terms and conditions as the Secretary of the Army determines advisable in the public interest, and particularly such terms and conditions as he determines advisable—

(a) to assure that the use of the land by the Brownsville Navigation District or its transferees will be compatible with the construction, maintenance, and operation of the river and harbor project at the location; and

(b) to assure that the United States, and its employees, agents, and contractors shall have the right to utilize the existing causeway, constructed by Cameron County, Texas, for access to Padre Island, Texas, in connection with governmental activities, without charge.

SEC. 3. The conveyance authorized by this Act shall reserve to the United States all right, title, and interest in source material (as defined in the Atomic Energy Act of 1954) in the lands conveyed.

[S. 1069, 84th Cong., 1st sess.]

A BILL To amend section 2 of the Act of March 2, 1945, pertaining to the Columbia River at Bonneville, Oregon

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That section 2 of the River and Harbor Act approved March 2, 1945, pertaining to the Columbia River at Bonneville, Oregon, is hereby amended by striking out the amount "$50,000" and substituting in lieu thereof "$185,000".

[S. 1070, 84th Cong., 1st sess.]

A BILL to amend section 5 of the Flood Control Act of August 18, 1941, as amended, pertaining to emergency flood control work

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That section 5 of the Flood Control Act of August 18, 1941, as amended by section 210 of the Flood Control Act of 1950, is hereby further amended to read as follows: "That there is hereby authorized an emergency fund in the amount of $15,000,000 to be expended in flood emergency preparation; in flood fighting and rescue operations, or in the repair or restoration of any flood control work threatened or destroyed by flood, including the strengthening, raising, extending, or other modification thereof as may be necessary in the discretion of the Chief of Engineers for the adequate functioning of the work for flood control. The appropriation of such moneys for the initial establishment of this fund and for its replenishment on an annual basis, is hereby authorized: *Provided*, That pending the appropriation of said sum, the Secretary of the Army may allot, from existing flood-control appro-

priations, such sums as may be necessary for the immediate prosecution of the work herein authorized, such appropriations to be reimbursed from the appropriation herein authorized when made. The Chief of Engineers is authorized, in the prosecution of work in connection with rescue operations, or in conducting other flood emergency work, to acquire on a rental basis such motor vehicles, including passenger cars and busses, as in his discretion are deemed necessary."

Senator KERR. Gentlemen of the committee, we are happy to have the Chief of the Corps of Engineers and his staff here. We want to put into the record some general information with reference to the program of the engineers and individual projects authorized and up for consideration to be authorized.

It will be the hope of the chairman that the committee will be able to have full public hearings on all of the bills referred to this subcommittee and that interested citizens and officials will take advantage of the opportunity for full and complete public hearings.

We would be glad to hear your opening statement, General Sturgis.

Senator CASE. Mr. Chairman, before you do that, might I ask a question? I have been assembling some data with respect to some modifying language that seems to be necessary in connection with the Missouri River program at some points. The information has not all come in yet. The bill consequently has not been drafted, and I anticipate that we can have a draft of it some time during the week.

If we can and do, would it be possible to include that on the agenda of the committee for consideration?

Senator KERR. Yes; it certainly will.

Senator CASE. Thank you.

STATEMENT OF MAJ. GEN. SAMUEL D. STURGIS, JR., CHIEF OF ENGINEERS, DEPARTMENT OF THE ARMY

General STURGIS. Mr. Chairman and members of the committee, it has been almost a year since representatives of the Corps of Engineers appeared before the Public Works Committee. At that time the last Omnibus Flood Control and River and Harbor bill, which was enacted into law as the act of September 3, 1954, was under consideration.

I was glad to receive the letter of March 10 from your chairman requesting that I meet with you and discuss the civil works program administered by the Corps.

It is essential to a healthy, remunerative, and popular public works program that the Chief of Engineers make an annual report to the Public Works Committees of the Congress, and at that time bring to your attention the progress that is being made and the major problems that confront us.

At the same time it is also most valuable for us to obtain the views of this committe and the Congress where lie the major responsibility for national policy determinations in the water resources field. Indeed, I hope that hearings of this kind may be scheduled regularly on at least an annual basis.

In taking advantage of this opportunity I shall first present a brief evaluation of the Civil works program as it stands today. The Assistant Chief of Engineers for Civil Works, Brigadier General Itschner, and members of his staff will be available during these hearings to furnish you with further details regarding the program

and to testify on a number of bills which I understand are now before this subcommittee for consideration.

During my period of service with the Corps of Engineers, I have seen this civil works program grow from a relatively small Federal activity prior to World War I, concerned almost entirely with navigation improvements, to become one of the major elements of Federal public works and far and away the major part of the national water resources program.

In fact, during the past quarter century our work has come to embrace all of the most complex phases of river basin and water resource development.

As of this date we have completed over 2,000 authorized improvements with an estimated cost of $3.1 billion. We have in a construction status 171 projects with a total estimated cost of $6.1 billion.

The difference, Mr. Chairman, has been due to the larger multiple-purpose projects.

These include many projects, such as that for flood control and navigation in the alluvial valley of the Mississippi, which are sufficiently advanced to be in an operational status, and annually producing very substantial benefits. Projects in this category of "under construction" will require $2.7 billion of appropriations after fiscal year 1955 in order to complete.

In the category of authorized work not yet started, our active authorized civil works program includes 695 projects with a total estimated cost of $6 billion.

Thus, to complete the work underway as well as the active projects not yet started will involve future appropriations totaling $8.7 billion. This is what I shall refer to as the current backlog of civil works improvements.

I have, on a number of occasions, pointed out the ominously rapid growth of this backlog from about $400 million in 1927 to its present status of $8.7 billion—an increase of 2,200 percent in less than 3 decades.

I recognize, of course, the many demands upon the Federal Treasury, and that water resource development must take its place priority-wise along with other needed Federal functions. It is evident, however, that the demands of the country of water resource development, as evidenced by serious congressional study prior to authorizations and after further current screening for sound, well-justified improvements by my office, are far ahead of our present ability to provide funds for this work. Still funds in construction are losing rapidly to the mounting backlog and the size of the backlog periodically accelerates.

Senator CASE. Mr. Chairman, might I ask a question?

Senator KERR. Yes, Senator Case.

Senator CASE. Are you going to present us with a table that will show the appropriations from 1927 to the present time?

General ITSCHNER. We have no such table here, but we would be very happy to get you such data.

Senator CASE. Give us the comparison of the backlog in 1927 up to now. I thought if you had something that would show the margin of backlog, it would be helpful.

General STURGIS. We have had that before, and I think we can bring it up to date.

General ITSCHNER. Yes; I actually have the data here but not in tabular form.

Senator CASE. Put one copy in the record.

Senator KERR. Yes.

(The information requested is as follows:)

Summary of civil works appropriations through fiscal year 1955

[In millions of dollars]

Period (fiscal years)	Appropriations [1]	Equivalent [2] in 1954 dollars	Average annual appropriation	Average annual equivalent appropriation in 1954 dollars
1824–1910	624.0	5,400.0	7.2	62.8
1911–20	347.2	1,450.0	34.7	145.0
1921–30	674.8	1,930.0	67.5	193.0
1931–40	1,904.0	5,530.0	190.4	553.0
1941–50	3,126.9	5,350.0	312.7	535.0
1951	619.0	730.0	619.0	730.0
1952	581.2	670.0	581.2	670.0
1953	561.8	600.0	561.8	600.0
1954	422.5	430.0	422.5	430.0
1955	443.4	443.4	443.4	443.4
Total	9,304.8	22,533.4	3,240.4	4,362.2

[1] Above figures represent total appropriations for new work, maintenance, and miscellaneous activities. Appropriations for new work amount to $6.65 billion (75 percent of total), which converted to 1954 construction dollars would approximate $16.6 billion.

[2] Based on converting appropriations to July 1954 construction dollars by applying ratio of July 1954 Engineering News Record construction cost index to average index for period shown. For period 1824–1910, available building material indices were used.

Backlog of civil works projects

	Billions
1927	0.4
1937	0.9
1947	5.4
1954	8.7

Estimates are at price levels prevailing for indicated year. Annual estimates of the backlog for earlier years of the period are not readily available. Estimates of backlog in the intervening years are not available.

General STURGIS. Now, as to navigation, let us briefly review by function the value to the Nation of the program completed and in operation. The navigation element of the civil works program consists of three major parts: Coastal harbors, Great Lakes harbors and channels, and the inland and intracoastal waterways.

Coastal harbors: As a result of progressive improvement of our coastal harbors, channel and harbor depths have been increased from the inadequate facilities provided by our natural bays and coastal rivers to depths of 35 feet which prevail at major harbors on the Atlantic and as deep as 45 feet at New York.

In spite of phenomenal previous growth, commerce handled by these ports in the last quarter of a century has shown a steady increase from 307 million tons in 1929 to 477 million tons in 1953. In the latter year 21 individual deep-draft ports handled 10 million or more tons each.

Senator KERR. General, now at that point, has that increase been brought about primarily because of increased facilities in additional harbors, or has it been brought about—or rather are you now talking about coastal harbors?

General STURGIS. I am just talking about coastal harbors.

Senator KERR. That figure is just our coastal harbors and in the main it has been increasing in business and that has necessitated additional harbor development in new areas.

General STURGIS. There have been both, Senator Kerr. In other words, I feel that just like the pressure for the backlog, the pressure has come on naturally as commerce has increased for both more harbors and deeper harbors; and, of course, the authorizations after consideration by Congress have yielded to that economic pressure, and I can say that the harbors have been deepened and increased due to the pressure of commerce.

Senator KERR. Is the increase primarily brought about by more traffic in the same harbors or primarily because of added volume from new installations?

General Sturgis. I think that it has been both, sir.

Senator KERR. You would not be in a position to say which one has contributed the most to that increase?

General STURGIS. No, sir; I do not think I can say that because, for instance, let us take the development along the gulf coast of Texas, look at the chemical industry that has located there recently.

Senator KERR. And in many places new harbors?

General STURGIS. Yes, sir.

Senator KERR. I would presume that information on table IV is pertinent to what you are now talking about, sir.

General ITSCHNER. That is correct, sir; it does list a number of new harbors, which are, especially along the coast General Sturgis spoke of, primarily petroleum harbors.

Senator KERR. All right, General, you may proceed.

General STURGIS. In discussing the navigation program, I cannot stress too strongly the importance of the fact that these harbors are national facilities which are essential to maintenance of our position as a leading maritime nation and to our national defense.

We must continue to improve them to meet the demands of modern seaborne transportation and to maintain them after improvement. This assumes increasing importance in considering the potential of nuclear warfare to destroy several of our major ports in a few days and stresses the great importance of ultimate port capacity.

The Great Lakes harbors and channels which have been improved by the Federal Government provide a vitally important transportation system.

This system is now connected with the Gulf of Mexico by means of 9-foot draft barge navigation provided by the improved Illinois and Mississippi Rivers, and the connection will be complete for modern barge transportation with elimination of the Calumet-Sag bottleneck. Funds in the amount of $4 million to initiate this remaining work are included in our budget request for fiscal year 1956.

Perhaps the most important addition to the Great Lakes system will be the construction of the St. Lawrence seaway. This project with an estimated cost of $97 million was started last year and is scheduled for completion in the fall of 1958. It will give our lake ports access to the sealanes of the world via channels of 27-foot depth.

As you know, we have been working for nearly a year now as the construction agency of the St. Lawrence Seaway Corporation under

the very able and distinguished chairmanship of Mr. Lewis Castle and his staff.

This is a new experience for the corps, from our viewpoint it is working out very well, and we aim to serve Mr. Castle and the Corporation to the best of our ability.

With the improvements which are now underway and contemplated for the Great Lakes it seems certain that the immediate future will witness a tremendous growth in commerce on these harbors and waterways, and it is plain that a great feeling of appreciation, confidence, and optimism energizes the entire Great Lakes region.

Moreover, that it contains the seeds of national benefits is evidenced by the widespread support the seaway has received throughout the Mississippi Valley including the lower river.

Now, on the third element, waterways: The third element of the navigation program is the inland and intracoastal waterway system.

The Federal Government has improved in varying degrees some 22,600 miles——

Senator KERR. May I interrupt there. I know that the Duluth-Superior Harbor still is second in the Nation according to the tonnage handled.

General ITSCHNER. That is correct. Duluth-Superior is second in tonnage in the Nation.

Senator KERR. Is the new development for the handling of ore from the Mesabi Range in connection with the Duluth-Superior Harbor or will there be a new harbor?

General STURGIS. That is the taconite development you are speaking of, is it not?

Senator KERR. Yes.

General STURGIS. I was up there last summer, and there are three steel companies which are involved. Only 2 of them are really active, and the Republic Steel and the Bethlehem Steel have 2 mining companies doing the construction of that job, which, I am informed, is going to be in the neighborhood of $300 million.

As I understand it, United States Steel has such an extensive reserve of the original ore, that they are not pushing right at the present time, but to specifically answer your question, each of these other companies are building new harbors by taking offshore islands, say, 60 to 70 miles up the lake north of Duluth, and they are converting those islands by breakwaters into harbors; and one of them is building the taconite plant at the harbor, and the other one is building its taconite plant up in the Mesabi Range itself.

Senator KERR. Will that traffic be handled through the Duluth-Superior Harbor or a separate harbor?

General STURGIS. These two steel companies are building their own harbors.

Senator KERR. And it will not be handled through there?

General STURGIS. No, sir; but I think while it cannot be attributed to the taconite industry, there has been a greater increase in the commerce and the economy of Duluth, and, of course, there are great reserves of Mesabi ore, but, Senator, the important thing to me about what is going on up there is this: that by the taconite development we can save our richer ore, which runs 50 or 60 percent iron.

That means in time of war you can make a quick shipment without having to go through a taconite process and therefore saves war reserves, so to speak, if the taconite is developed.

Senator KERR. Where is that? Is that shown on one of these pages?

General ITSCHNER. The increase is not shown on these tables, sir. The current traffic is shown on them, however.

General STURGIS. The Federal Government has improved in varying degrees some 22,600 miles of waterways in this country to give us the most extensive inland navigation system in the world.

The major inland and intracoastal waterway system, however, consists generally of those waterways which afford the 9- to 12-foot depths needed by modern barge navigation.

These have a total length of about 8,300 miles. Traffic on our waterways has grown tremendously during the last 25 years from 8.6 billion ton-miles in 1929 to 75.1 billion ton-miles in 1953—an increase of 800 percent in the 25-year period.

Senator KERR. Would you repeat those figures, General?

General STURGIS. Yes, sir. Traffic on our waterways has grown tremendously during the last 25 years from 8.6 billion ton-miles in 1929 to 75.1 billion ton-miles in 1953.

Senator KERR. That is traffic on the inland waterways?

General STURGIS. Yes, sir; that is right, an increase of 800 percent.

This third element I am speaking about, this traffic consists of movement, both by public water carriers and by towboat and barge fleets owned by industry, of the heavy bulk commodities most suitable for water movement.

Thus, the waterways supplement the land carriers as an integral part of our transportation structure.

For example, it brings the bulk materials which are manufactured by plants and then converted into items which are shipped by rail elsewhere on a wide distribution after manufacture.

Senator KERR. Would you have an estimate as to whether or not railroad traffic has also greatly increased in the areas adjacent to these waterways during the time the waterways traffic itself has increased so tremendously?

General STURGIS. I certainly think that would be generally true. For instance, I know down in Houston, Tex., it has been tremendous, but I do not have any reports, and I do not have any way of breaking down data so as to make a comparison of how much might be due to the increase of general economic activity and how much due to being able to transport bulk goods cheaply by water, but there certainly have been increases almost everywhere.

I have been impressed by the extent to which industrial development has followed waterway improvement, as industrial plants are located along our navigable rivers to reap the benefits of economical water transportation. For example, some 2,500 new industries have located along the canalized Ohio River since World War II, to say nothing of what happened when it was canalized from 1880 to 1914 or 1915, when the old system of locks was completed.

Of the total, the Federal investment of $6.5 billion, the amount chargeable to these waterways totals about $1.9 billion through fiscal year 1954. We estimate on a very conservative basis that transportation savings from use of these waterways during the 25-year period

alone, ending 1953, have exceeded that amount—that is, the investment—and at the present time the waterways as a whole are returning in terms of annual benefits versus annual costs considered on their life to date, which is just 25 years, over $3 for every Federal dollar appropriated for them.

The next subject, sir, is flood control. Federal participation in flood control is, as you know, of much more recent origin than navigation. It began in the year 1928, when Congress adopted the major project for flood control in the Alluvial Valley of the Mississippi, following the great flood disaster down there, and was expanded to a nationwide basis by the first general Flood Control Act of 1936.

Over this relatively brief period, however, Congress has authorized over 700 projects which comprise the active flood-control program, with an estimated cost of about $9 billion.

Appropriations for flood control through fiscal year 1954 have totaled $3.6 billion, leaving about $5.4 billion as the amount required to complete the authorized program.

These are large amounts, but the flood problem in this country is one of tremendous magnitude which can be solved only by bold and far-sighted measures.

Senator KERR. General, is this a part of the items set forth on table I?

General STURGIS. I am going to have to ask General Itschner to answer that question.

General ITSCHNER. Yes, sir; it is summarized in table I.

Senator KERR. Table I includes both flood control and navigation?

General ITSCHNER. That is right, sir.

Senator KERR. All right.

Senator CASE. Mr. Chairman, I note on table XI that the figure of $3.6 billion shows the total fund for active projects and some $5.3 billion to complete; but below that inactive or deferred projects, $7.5 billion. It is something over $2 billion as inactive or deferred, is it not?

General ITSCHNER. That is correct. $2.1 billion.

Senator CASE. What do you include under inactive?

General ITSCHNER. They are authorized projects which for some reason are now found not to be justified, desired, or necessary.

Senator CASE. They have not been appropriated for or are not being appropriated for?

General ITSCHNER. That is right,sir.

General STURGIS. You may remember, Senator Case, that a few minutes ago, I indicated that Federal projects had been screened by my office—those projects that are authorized—and we, therefore, created an active program where we found and categorized those projects which are modern, which are unquestionably justified, and which have no real obstacle to their being built.

Senator KEER. That was done in Washington through a direction from a committee of the House, was it not, General?

General ITSCHNER. That is correct, sir, in response to a directive from the Bureau of the Budget and one from the House Public Works Committee.

Senator CASE. The actual appropriation on these projects is less than $10 million, $9.7, I notice you have here.

General STURGIS. Yes, sir; but that was including the cost of the investigation itself, and there have been some projects—I cannot recall right offhand——

Senator CASE. There has been no substantial deferment on which there has been any major appropriation for actual construction, has there?

General STURGIS. There have been a few: Tuttle Creek, I think we have put in $4 or $5 million, enough to build an access road and a warehouse.

Senator CASE. What about Tennessee—Tombigbee—that is not flood control, is it?

General ITSCHER. It is a flood control project as well as a navigation project, but we have not put anything except planning money on that.

Senator CASE. Thank you.

General STURGIS. We estimate the potential average annual flood damage in this country, assuming no Federal works in operation, at over $900 million.

We have completed or placed in operation 391 flood control projects. These we estimate now operate to prevent over $490 million in damages each year. I wish to emphasize this figure because much publicity is given to floods and flood damages which still occur in unprotected areas or at localities where protective works are not complete.

On the other hand, the flood protection that Congress has provided since 1928 for preventing damages year after year is taken for granted, particularly as older people pass on whose memories and sobering flood experiences antedate our work.

The flood problem, however, is still an urgent matter and minimum adequate protection is not yet available in many areas. Even after we have completed the projects now under construction and those authorized, but not started, there still will remain a residual average flood loss of about $200 million annually.

This is a drain on our economic resources which this country can ill afford. Moreover, this loss will increase rapidly with our growth of population and industry in the valleys as our economy continues to expand and requests for authorizations continue to pour in on Congress as God's great storms and human progress continue to occur together in the same valleys.

This flood problem and our efforts to solve it are nationwide in scope. Floods and flood losses vary widely in character and magnitude between major river basins. The largest flood problem in the Nation existed in the alluvial valley of the Mississippi River, but here where a major Federal effort has been underway since 1928, we have achieved our greatest progress in reducing the flood hazard.

In other river basins like the Ohio we have made substantial progress, but the valley does not yet have adequate protection against great floods like those of 1913 and 1937. Moreover, it is both ominous and prophetic of other areas that factors are at work, due to the extremely rapid industrial development of the Ohio Valley, that give me great concern for solving the flood problem under present policies and procedures. Most of our other major river valleys are similarly still exposed to heavy flood damage, but the flood-control plans, if supported by appropriations, could be wholly effective.

I should point out that the flood-damage figures I have quoted are only for the main river and major tributary valleys of the country. Additional flood damages occur, of course, in the smaller valleys of upstream tributaries. These losses are individually small because the watersheds are relatively small themselves.

But I especially invite your attention to the fact that by the same token they do not have the great economic impact of the distaster-type floods on main rivers which attracted Federal attention to this problem caused by huge economic losses, thousands homeless, and great loss of life occurring in a relatively brief period of time.

However, in the aggregate, over a considerable region these isolated small upper-valley floods produce a large economic loss—estimated by the Department of Agriculture at $300 million annually.

May I also emphasize that the damage figures I have quoted do not include the terrific loss of over $300 million which was inflicted in a few days upon the North Atlantic and New England coasts by hurricanes in the fall of 1954. As you know, like major river-valley floods, this had a terrific and widespread impact more or less all at once.

I know that this subcommittee has under consideration legislation which would authorize the Corps of Engineers to study this situation with a view to recommending measures which will reduce the impact of hurricane damage in this area.

This will be a difficult study, which will require consideration of many unusual problems. Solutions, where feasible, may prove very expensive. If this study is authorized, however, I can assure you that the Corps of Engineers will devote its best talent and full energies to the difficult task.

In concluding my remarks about the purely flood-control aspect of this program, I need not repeat to you that the work already accomplished has been well worthwhile.

In the limited time in which the Federal works have been in operation, only 11 years in the average river basin, they have already prevented flood damage of over $7 billion. This is more than twice the total Federal appropriation for construction of the flood-control works in operation that have prevented this damage.

Senator KERR. And the total cost of the projects affecting that savings was how much?

General STURGIS. I think it was about $3.6 billion, as I recall it.

General ITSCHNER. The total cost through fiscal year 1954 is $3,665,400,000.

Senator KERR. Your estimate is that there has been that saving in 11 years?

General ITSCHNER. In an average of 11 years. Some projects are older and some are younger

Senator KERR. What do you estimate the average life of the project is?

General STURGIS. That varies, but most of our projects, for instance, for amortization purposes, are estimated at about 50 years, but some of those dams in the Southwest will last much longer than 50 years, but it has been a practice from a point of view of sound conservative economics to give them a life of about 50 years. But, they actually have a greater life than that.

Senator KERR. In other words, based on a 50-year average, experience would justify the belief that the flood-control project of the Government would effect a saving of 10 to 1 of the cost; is that right?

General STURGIST. I would say it would be in the neighborhood of about 3 to 1.

General ITSCHNER. Based on the figures that you have been given and using the $2.30 rate for every dollar invested, which was based on the 11-year average life experienced, it would be about 10 to 1.

General STURGIS. Yes; on the 11 years. I was thinking of the overall figure.

Senator KERR. All right, sir.

General STURGIS. Now, as to hydroelectric power——

Senator KERR. Excuse me, General Sturgis. May I interrupt you at that point. That is going to mean if the experience to date is indicative of the future that the economic return on these flood-control projects is going to be far greater than the base of the estimates for the construction of the projects?

General STURGIS. I could not say that that was true for every project.

Senator KERR. We are talking about the average now.

General STURGIS. Yes; I think so.

Senator KERR. Because those are the figures you have been giving us—they have been on the average; have they not?

General STURGIS. That is true, because if you go on to provide this flood protection, and industry and population grows in these valleys, you are getting much more protection. Senator Case may know, since we discussed it out there in the Missouri River Basin, the large loss that is still occurring in farm population in those States, for example; where are they going?

The people in those States quite naturally understand that we want them to go somewhere in that State and not out of it, and they are going into the smaller and larger towns, so as the towns grow disproportionately, that means that the flood protection will grow greatly, of course.

Senator KERR. The reason I am delighted to have that information, gentlemen, is that it refutes the arguments that are being used now by some elements in the Administration that the flood control projects in projects before us, the authorization for those should be reduced, and that in order to authorize a project an affirmative showing be definitely made that the country benefits, such as reimbursement from power and municipal water supplies and so forth, must be increased, because of a different formula of benefits with reference to flood control, is that not so?

General STURGIS. I am going to speak on the water supply side of the problem, which today is becoming more and more important, in just a minute.

Senator CASE. You are not asking the general to affirm that certain elements in the Administration are saying that, are you, Mr. Chairman?

Senator KERR. No; of course not. That was my own observation.

Senator GORE. I understood the Chairman to affirm that.

Senator KERR. That was my observation.

Senator GORE. Mr. Chairman, you have stated that in general the economic feasibility of the projects is exceeding expectation. I wonder if the general can tell us to what extent that is true.

Senator KERR. As I understand his testimony, the average of the projects authorized and which were constructed in whole or in part had an economic ratio of about 3 to 1, is that not right?

General STURGIS. That is right.

Senator KERR. In 11 years, the projects that have been built and are being operated have already accrued an economic benefit of 2.5 to 1 of the amount invested in those projects; and based on their average life being 50 years, which is certainly not the extent of it but a minimum figure used in their calculations, that is going to mean that instead of benefits from flood control proving out to be something like 3 to 1, which was the basis of the estimate on which they were authorized, it will be in excess of 10 to 1 on the average.

General ITSCHNER. Your figures are exactly correct based upon past experience as shown in the figures that we have given you, about 10 to 1.

Senator KERR. Does that answer the question?

Senator GORE. It does. I think that is encouraging information.

Senator KERR. It is information of the greatest significance, especially in view of the fact that there seems to be an attitude on the part of the Budget to require a lesser percentage of the total cost being allocated to the flood control features of projects.

Senator CASE. Is the chairman referring to specific projects? Are we going to pick up some specific projects in that?

Senator KERR. The reference was made primarily because of the indications that the Budget Bureau would have a different viewpoint this year than it had last year with reference to the amount of benefits that would be issued to the flood control features or certain specific features.

Senator CASE. I think it would be interesting to the committee to go into that when we have some project reports that deal with that.

Senator KERR. I do too, but this information was of special significance, and I thought it would be of interest to the other members of the committee.

Senator CASE. I was not aware that the Budget Bureau was reducing disproportionately the amount allocated to flood control; but since you have raised the question, I would like to ask the Chief of Engineers if they have received any instruction in regard to changing the percentage for their method of evaluating flood-control benefits.

General STURGIS. For evaluating flood control—of course, there is a question of local cooperation; but as far as evaluation we have been following the directive A–47 for several years now.

Senator CASE. I was just wondering how you could and how you would change your evaluation of flood-control benefits.

Senator KERR. I would say that the thing that is in my mind—maybe I did not make it clear, Senator Case—and, General, you can explain this better than I can, the principle of separable costs remaining benefits. Can you explain that?

General STURGIS. That is a very complicated subject, but we have Mr. Kinney who is here today who will try to give as simple an illustration as possible.

But what it does is try to get away from the criticism that has been leveled, not particularly at us, but at many Government projects, that

the value of the benefits in the project has not been charged to each purpose properly.

In other words, for example, power in some cases has been evaluated on an incremental basis—for instance, let us take a multiple-purpose power project, where the value of the project for the purpose of navigation and flood control or the other major purposes have been charged to those purposes, and then the power plant itself is all that has been charged to power.

In order to get away from that method and make each purpose of the project share its proper share of the cost, the separable cost-remaining-benefits method has been used, not exclusively because in some cases other methods are applicable. If you desire at this time—and it is a rather complex problem—I would have Mr. Kinney explain that to you.

Senator CASE. Mr. Chairman, I think it would be interrupting the purpose of this particular meeting, but I was intrigued by what you say, because it had not come to my attention that there had been any change in the method of determining the benefits of projects.

General STURGIS. As you know, sir, we have got together with the Department of the Interior in this connection, particularly with respect to power, in order that its true value may be charged.

We did that about 2 years ago and have consummated an agreement providing for the use of the separable cost-remaining benefits method.

Senator KERR. I will be glad to give the Senator a memorandum on it if you would like me to. The effect of it is this—and you correct me if I am wrong—that as a result of the method applied the Departments show a greater percentage of the total costs to be reimbursable from power and irrigation or on other reimbursable items than has heretofore been the case.

General STURGIS. In some cases.

Senator KERR. It occurs to me that we ought to take up some specific examples during the course of the hearings and go into those.

General STURGIS. We are prepared to do that at any time, Mr. Chairman, but let me say it does not affect the overall economic ratio. In other words, no change has been——

Senator CASE. The benefit-cost ratio remains the same so that if a project were feasible before, it would still be feasible, is that it?

General STURGIS. Yes, but for each purpose within the overall project, we also require it to be justified on its own. In order words, we do not have the whole constituted of parts that are not economically sound.

Senator GORE. Mr. Chairman, some time during the course of the hearings, I hope we will have an opportunity to examine this change in the apportionment formula with respect to the various purposes.

Senator KERR. I did not intend to inject it into the hearing at this point. My only purpose was to call attention to what I thought was the dramatic fact that the history of flood control projects shows that the benefits accruing greatly exceed the estimates that were used in the justification for the participation in the projects.

Senator CASE. Mr. Chairman, will these several tables in this mimeographed assemblage that have been handed us be incorporated at the end of the various remarks?

Senator KERR. I would ask the general if he did not feel it would be beneficial to have these tables included as a part of the record of this hearing.

General ITSCHNER. We thought that they could be very properly included. They are the most comprehensive analytical study we have had of our entire program, and they are suitable for inclusion in the record.

After General Sturgis is through, I would like to run through them rather quickly and point up the high points in them, sir.

Senator CASE. Mr. Chairman, my request was occasioned, before we got into this little side question on the allocation of cost, to the tables XVII and XIX, which have to do with hydroelectric power in projects completed and projects under construction.

It is quite significant and the tables on this certainly should be made a part of the record. The thing that struck me in looking at them was the fact that of the completed projects—and I have heard a good deal about a number of these—but only 1 of the completed projects has a capacity of over 500,000 kilowatts generating capacity.

Several of the projects under construction are not over 1,200 kilowatts. In other words, whatever record may have been made by the hydroelectric power already brought into being in the course of the next 5 years, we are going to complete projects that are much greater in magnitude.

General STURGIS. Yes, sir; then, of course, part of the McNary Dam is completed. There are only 5 or 6 generators in there. I think it will go to 14 generators; but all they have to do basically is to install the generators to increase the total capacity which is somewhere around a million killowatts.

Senator KERR. Do you have anything further, Senator Case, at this point?

Senator CASE. No, sir.

Senator KERR. All right, General.

General STURGIS. The civil-works program for the improvement of rivers and other waterways for the primary purposes of navigation and flood control has afforded many possibilities for the development of water power. The importance of a comprehensive development of the Nation's water resources for all purposes has been recognized, and under existing law and Federal policy the corps investigates, plans, recommends, and constructs multiple-use developments which include power.

We now have 2,981,000 kilowatts of capacity in service at 21 projects.

Senator KERR. Would you repeat that figure? Is that on one of these tables?

General ITSCHNER. That is in table XVIII and table XIX.

General STURGIS. 2,981,000 kilowatts of present installed capacity.

Senator CASE. To get that figure, you have to add the figure on table XVIII and the first figure on table XIX, do you not?

General ITSCHNER. That is right.

General STURGIS. The existing and planned installations at all of the 33 Corps of Engineers' projects which are already in operation or under construction totals 6,727,400 kilowatts, and the total ultimate installation for all authorized projects, including those not yet started, amounts to more than 14 million kilowatts.

To indicate the relative magnitude of the corps' power program, the total installed capacity in this country was 102,500,000 kilowatts at the end of 1954. Of this total about 23 million kilowatts was hydrocapacity. Therefore, the corps' program entails well over 50 percent of the national hydrocapacity and about 16 percent of the total capacity.

Senator KERR. General, that does not include the power projects under the Department of the Interior, does it?

General STURGIS. No, sir; these are of the Engineers only.

Senator CASE. Does it include the St. Lawrence seaway?

General STURGIS. No, sir; because you see that is not under us. That is under the New York State Power Authority and the Hydroelectric Power Commission of Ontario, and we do not have anything to do except work with them on mutual problems that arise in that general region.

Senator KERR. Would you give us an estimate percentagewise of comparable figures for Interior's program?

General STURGIS. I am afraid I could not offhand. I know that it is considerably less than our program.

Senator KERR. Do you have someone here who could give us a reasonably accurate estimate?

General ITSCHNER. It is substantially less, but percentagewise I could not tell you.

Senator CASE. Might it be supplied for the record and also the figures on the same points?

General ITSCHNER. Yes, sir; we shall insert that information in the record.

The information requested is as follows:

As of 30 June 1954, the Bureau of Reclamation of the Department of the Interior had 4,718,450 kilowatts installed at projects constructed and operated by that agency. Additional capacity of 367,500 kilowatts was being installed making a total of 5,085,950 kilowatts in operation or under construction by the Bureau. The Corps of Engineers had 2,516,800 kilowatts' capacity in operation at 30 June 1954, or about 35 percent of the 7,235,250 kilowatts operated by the 2 agencies at that time. The Corps has 6,727,400 kilowatts of capacity either in operation or under construction or about 57 percent of a comparable total of 11,813,350 kilowatts for the Bureau and the Corps combined. The ultimate installation of generating capacity in the program of the Bureau of Reclamation, as indicated in the annual report of the Secretary of the Interior for fiscal year 1954, amounts to nearly 6½ million kilowatts. The ultimate installation for all authorized Corps' projects is about 14 million kilowatts, which constitutes about 68 percent of the total capacity in the combined programs of the 2 agencies.

The international St. Lawrence power project will have a total installed capacity of 1,824,000 kilowatts, half of which, or 912,000 kilowatts, will be in the United States.

General STURGIS. Just informally, some of our people think it is about two-thirds.

Senator CASE. That does not include the power that is developed at the Panama Canal?

General STURGIS. No, sir.

When the general flood control program was initiated in 1936, practically all projects authorized and undertaken initially were projects for flood control only.

Since that time it became evident to Congress and the nation that our waters must be put to all possible beneficial use. Currently about

35 percent of the entire civil works program, in terms of estimated cost, is for multiple-use developments which involve hydropower development.

The Corps of Engineers constructs and operates these projects as authorized by Congress, but under existing law the power is turned over to the Secretary of the Interior for marketing and distribution.

My next subject is water supply. This brings me to what I consider is coming to be one of the most important functions of the civil works program: water supply.

The recent drought periods in this country have made it all too apparent that our water supplies for domestic, industrial and agricultural use are limited. A prudent look to the future reveals the fact that water must be conserved on a major scale and managed wisely to meet needs of future generations.

Considering the period necessary for development of these major sources of supply, we have little time to lose in getting started. Indeed, time already may be running out.

Provision of water supplies for domestic and industrial purposes today remains essentially the responsibility of local and state governments and of private industry.

The Corps of Engineers, however, has authority under existing legislation to provide additional storage capacity in Federal reservoirs built for flood control or to dispose of water provided by such projects which is surplus to the authorized functions.

Under these authorities water supply storage is being provided by the Corps from 11 reservoirs, and negotiations are under way for provision of water supply storage in 3 more reservoirs. Approximately 1,300,000 acre-feet of storage space will be made available under these agreements for water supply to about 30 municipalities.

In addition to that storage contracted for, many other communities such as those on the Ohio, Missouri, and Mississippi Rivers are enjoying improved water supply conditions by improvements in low flows resulting in reduced hardness, reducing pumping lifts, and general improvement of the quality of raw water.

It is estimated that some 1,400,000 acre-feet of storage in the Ohio River Basin provide low-flow-regulation benefits to over 2,000 miles of streams. In other more arid parts of the country, corps' reservoirs have been operated in such a manner as to prevent complete drying up of the river beds downstream which has enabled industries and municipalities to continue operation under recent drought conditions.

In our planning for river basin development, we have been directed by Congress to consider all water uses and problems. Consequently, we have authority to plan to meet water supply needs as well as for solution of the flood and other problems.

I personally feel that water supply is of such vital importance to the maintenance of our economy and to the development of many parts of our country that from now on most reservoirs built for river control must include storage for water supply to assure appropriate low-flow regulation for rivers coursing widespread areas.

The water situation is acute, as you know, in the Southwest and is becoming critical even in the normally humid East.

In the next 25 years the situation is certain to become much more serious as our population increases; as agricultural uses for water

create a greater demand; and as the requirements of an expanding industry continue to skyrocket.

Moreover, new technological demands such as vast quantities of water required for atomic energy plants as atomic power expands and the multiplication of air conditioning—all point toward an exponential increase in water demands.

These problems are far and away above that of providing small resources for municipal water supply.

Senator KERR. By "exponential increase" you mean a very greatly accelerated increase?

General STURGIS. Yes, sir.

Senator KERR. General, do you have an illustration or a table showing the increase in the per capita consumption of water in this country over the last 25 years?

General STURGIS. No, sir; I do not, but I would like to say I have become particularly cognizant after my experience with what has happened here in the Southwest and the Ohio Valley, which when I went there as a young captain in 1937 was in the midst of flood, and if it had not been for the conservation pools in our conservation dams, there would have been no navigation on the Monongahela River and the Ohio in the summer before last and last summer, and the pollution problem along the Ohio would have become terrific.

Just to give you some idea of the large scale of the benefits, the only reason that New Orleans did not have salt water by intrusion into its water supply for the last 2 years is we have been releasing up to 28,000 cubic feet a second from Fort Peck Dam, 2,500 miles away in northeastern Montana.

That gives you some idea of the things that are being done. I do not have the money—I do, I think, have authorization in terms of the old 308 report—but I do not have the money to actually study it and produce these specific answers, and, therefore, I have not done it yet.

I had a report from my River and Harbor Board a few months ago, and gave them the job of looking at this whole picture. We cannot talk about more than $1,000 or $2,000, something like that, though. I do not have a specific appropriation for it now.

Senator KERR. It is safe to say that the per capita consumption is increasing by leaps and bounds, is it not?

General STURGIS. That certainly is true; in areas of the country it has gone up 100 and 200 gallons, for instance.

Senator KERR. In your judgment that increase will continue, will it?

General STURGIS. Yes; it will. Industry is taking tremendous quantities of water.

Senator CASE. Mr. Chairman, I was just going to ask the general whether the little publication had come to his attention which was issued by McGraw-Hill Publishing Co., I believe, in 1952, entitled "Water" which had some very specific statements on the increase in the use of water.

General STURGIS. That has not come to my personal attention. I have told our River and Harbor Board to get together all the data they can from reliable sources in the absence of the fact that we are not able to engage in a regular survey Nationwide.

Senator CASE. Mr. Chairman, I would like to suggest, if it is not out of order, that the staff be asked to contact McGraw-Hill and get enough copies of the publication—it is a specific number of a regular

publication, but this one was devoted entirely to the subject of water and it had some figures that I think would be of interest to all the members of the committee.

Senator KERR. I wonder what the members of the committee would think about our staff working with the River and Harbor Board that the general has given this assignment to and maybe using some of the money assigned to this committee in order to help expedite that survey.

Senator CASE. I think it would be a good idea.

Senator KERR. I would not like for us to take any action on it now, but I think it would be a matter worthy of very serious consideration by the committee.

Senator CASE. I would like to see it done. As a matter of fact, I remember when we were down at the White House for the signing of the highway bill, the President turned to some of us after he had signed the highway bill and he said, now that gives us a start there, but the next big thing we have got to start is water.

He went on to say that he regarded the problem of water as the most important mineral-conservation program before the country.

I think some of those figures on the Southwest had been brought to his attention, but anyway it was on his mind, and I think anything that this committee could do to get some factual material together so that we could use it in support of the various conservation measures would be money well spent.

General STURGIS. May I say, Senator, that we would be very happy to work with the committee in that connection. We would prefer that the work be done through our office because the River and Harbor Board actually operates under me and so we would work with you on it and I am sure it would be most helpful to us.

In getting together some data on this very serious problem, I would like to just quote one thing, if I may, from a paper that we have prepared, and that is this:

> The Conservation Foundation of New York in a recent study made by the American Chemical Society found that nearly one-fourth of our people have inadequate water supplies and that our national use of water has increased 4 times in the last 50 years. It seems obvious, therefore, that water supply is now a more and more important factor of river-basin development and that it will become even more critical in the future and that further planning for its conservation is absolutely essential.

Senator KERR. Is that the total consumption increased four times or the per capita consumption?

General STURGIS. It would be total, sir.

However, this need for planning water supply in river-basin developments raises a difficult problem in project evaluation and cost sharing. We may be reasonably certain that additional water supply storage will be needed in an area within a relatively short time. And it would be poor planning not to provide for this.

The problem that then confronts us is how to evaluate that water when future customers, however certain, are not immediately available; and who will pay for the potential future water supply until such time as development of the region requires it?

This is an unsettled area in water-resource policy perhaps because it is a new problem, but I believe it is of vital concern to the States as well as to the Federal Government, and I think it is none too soon for Congress and the Nation to give the most serious consideration

to this situation in the vital interest of timely action for our future welfare, health, and prosperity.

The civil-works program has provided many other collateral benefits.

The reservoirs have provided needed recreational facilities in many areas throughout the country. Public use of these projects increased by 30 percent in 1954 to a total of more than 53,800,000 visitor days.

The projects, largely reservoirs, have created a huge potential for conservation and use of wildlife resources, on some 1.5 million acres of permanent water habitat and 2 million acres of shoreline range. Most of this is both suitable and available for the first time for management of wildlife in the public interest.

After this review of the functions and accomplishments of the civil-works program, I would like next to mention briefly the subject of personnel, because it is the people of our organization who are really the basic element for making this program go.

As you know, the reputation of the Corps of Engineers has been built solely on the high quality, professional competency, and honesty of the men and women who have been attracted to it from among the best in the Nation over the past century and a half. But our personnel situation today has become increasingly acute; and if this continues it will unquestionably have an adverse effect on the performance of our public works and our safety in war.

As you know, there is a general shortage of engineers in civil life. We find that in competition with private industry it is very difficult for us to attract and hold young engineers and other professional men, at the salaries and under the conditions of employment now prescribed by the Civil Service.

We are making strenuous efforts to overcome this handicap by putting our young engineers through a student engineers' training program, to provide them with a broad and valuable experience in formative years to help offset the higher salaries industry can offer. Also higher entrance salaries in the lower engineer grades have been recently authorized. While it is too early yet to definitely determine how successful this will be, I have little confidence in the results compared to the submerging of professional men in the civil service under the general schedule established since World War II, in lieu of the separate professional schedule which previously existed.

An equally serious current problem is our inability to hold our older key people who are at the top of salary grades allowed. Within the last year we have lost a number of our key engineers to private industry and to other Federal agencies. All of these men had many years of experience with the corps, but we did not have the salary grades to offer which were commensurate with their abilities—and which others could offer.

Senator CASE. Mr. Chairman, the competition of private industry is a thing which we can understand. We have that in other fields of Government actually, but I would like to have the general go back to the sentence there where he spoke of the submerging of engineers in other civil-service groups. I would like to have him elaborate on that a little bit.

General STURGIS. I remember that when I came into the Corps of Engineers, the morale was high.

Senator KERR. Do you mean among the civilian employees or the corps?

General STURGIS. Yes, sir; particularly the Engineers. I think all the morale was high. I get out and talk with these people today, and they are not just simply—if I may use a slang word—griping, but they do feel, and I think likewise, that a professional man who has to spend a lot of money for an education, and if in civilian life would have a license to operate like a doctor or any other professional man, has his status changed in that he no longer has a professional designation, that is having a very serious effect upon our people.

Senator CASE. That is due to what?

General STURGIS. We used to have what was known as the "P" class, as you will remember.

Senator CASE. Professional.

General STURGIS. Then the CAF class, which made a distinction. They had a professional grade, and generally the prestige of professional men was greater than, say, clerical men.

Now they are all thrown together in one general schedule category, and the Engineers are not given the weight that they once had.

Senator CASE. You are speaking now of the civilian employees of the Corps of Engineers; that is, civil employees?

General STURGIS. Yes, sir; I could say that our officer situation is even worse, but I am talking primarily at this moment about the civilian situation.

Senator KERR. I believe the Senator asked you what you meant when you said competition from other branches of the Government.

Senator CASE. I said we could understand what the competition is, for different employees of a technical character in the industrial field today. I know that every Sunday paper you see now in Washington, the first page or two of its classified section, is largely devoted to ads for technical employees or engineers.

I noticed one yesterday. It said "not merely a future but a present" with such and such an engineering firm. In other words, saying to these young engineers that you do not have to wait 25 years but you already have a big future in the present.

The first 2 pages in the Post and Star yesterday were almost wholly devoted to advertisements for engineers and technicians of one sort or another for the atomic developments and airplane manufacturers of one sort or another.

However, the problem of merging the professional men in the Corps of Engineers by the system of changing the old professional status of civil employees to coincide with the clerical and administrative group is of great concern to us here on the Hill.

I would like to know whether or not any representation on that has been made by your office to the Committees on Civil Service in the House and Senate.

General STURGIS. No, sir; I never made that directly and while I may be looking at it from the point of view of Chief of Engineers, I am responsible to the Army and to the Congress here for maintaining high quality of people.

I do feel, sir, most seriously the fact that by giving the professional man no recognition and/or prestige of his profession, however well that may work out for the rest of the Government, that it is not working out

well for the efficiency, and high quality, and attracting men of high character to the Corps of Engineers.

Senator CASE. Mr. Chairman, my reason for interruption in this particular place was because it seemed to me that it was a very serious thing that he was bringing to the attention of this committee and thereby to the Congress.

It is entirely conceivable that the Committees on Civil Service in both the House and the Senate have not called you before them because it has not occurred to them in that light; but you are bringing that to the attention of this committee, and I personally think it very appropriate.

But it seems to me that if that is to have any effect, that this testimony of the Chief of the Corps of Engineers should be brought to the attention of the Committees on Civil Service.

I personally would like to suggest that the staff bring this portion of General Sturgis' testimony to the attention of the chairmen of the Committees on Civil Service, of the Senate at least, in order that that problem may be made known to them.

It occurs to me also that the existence of this problem is evidenced by the increasing tendency on the part of agencies of Government, notably the Atomic Energy Commission, to let work by contract; that is, they contract for certain engineering services or for certain projects which involve engineering services, partly I think because of the general policy of the Commission, but in part I think because of the importance of getting certain work done on time.

I think the same policy is being followed by the several Defense Services—the Army, the Navy, and the Air Force. They are showing an increasing tendency to contract for engineering services. They contract with engineering firms who can pay whatever salaries they find it necessary to pay in order to get the help they want.

They are doing that rather than utilizing Government employees because either there is not a big enough supply of engineers or the Government services are not able to get the number and the quality of engineering proficiency that is desired.

General STURGIS. Senator Case, may I say in that respect, sir, that certainly in the Corps of Engineers traditional policy has been to contract for all the construction and the engineering we can.

Senator CASE. I think that is desirable. I think that should be, but I do think there is an increasing tendency to use contract services partly because of the shortage of engineers within the Government services.

It is true in highways, as it is true in highway commissions of the States, my own State highway commission, used to do its own engineering altogether.

It is letting an increasing number of its projects to contractors, and maybe that is a good thing; but it certainly is important that the Government be able to obtain a sufficient staff of competent engineers to work of these projects and to get them up in shape so that Congress can act on them.

General STURGIS. Absolutely, Senator Case; and may I say that they are needed, the high quality is all the more necessary when you have a fewer relative number and farm out a great deal of the work, because you must have individual men who can talk to the best that

there are in civil life and be just as good as they are, while protecting the Government's interest.

In other words, the men who farm out the work must be sure of the people to whom the work is farmed out, and therefore you must have people who are able to talk to the very best firms.

If you have low-quality people, the firms lose respect for them, and of course, they are able to get away with things that are expensive and which are not, you might say, always in the best interests of the United States.

Senator KERR. Off the record.

(Thereupon, there was a discussion off the record.)

Senator KERR. General, go right ahead.

General STURGIS. I have just indicated that we have had some very high-quality people with us. For instance, Mr. George Beard used to be with my organization, 20 years at least. People like that are leaving.

I feel that the people that we have here today—Carter Page, Joseph Brennan—can take their place with engineers anywhere in private industry or anywhere, and I feel that that type of man is not now being developed in sufficient numbers in the Federal service due to the engineering shortage, which is most serious throughout the country.

Senator KERR. Is the problem of compulsory retirement not affecting you?

General STURGIS. That affects the officers. If affects the officers very seriously. It means that I lose at the age of 51 or 52 some of my most qualified officers.

Senator GORE. Mr. Chairman, that is utterly indefensible.

Senator CASE. That we could do something about.

Senator KERR. Yes; it is utterly indefensible.

Senator GORE. To force a man of 51 to retire.

Senator CASE. Of course, we are doing the same thing in the services, retiring such men as General Bolte and General van Fleet when it seems to me that their counsel could be used.

Senator KERR. You may proceed, General.

General STURGIS. Might I say here, sir, in answering this last question, I was only referring to the fact that we do very greatly suffer by this loss of technical personnel at the ages of 51 or 52, losing them when they are entering their prime.

Senator CASE. Cannot these men who are in the service continue by Presidential waiver?

General STURGIS. I think, Senator, I may be speaking now from rather indirect knowledge, but I believe that there has been every effort made to hold those waivers to a minimum, and there have been very few exceptions because of the fact that if there were any exceptions made, it affects the justice of any other cases, people who are separated in toto.

Therefore, there has been a tendency, I believe, to make very few exceptions. We have one in the case of Colonel Trower. That was done on my request, because we had both the problem of the St. Lawrence to get started on and also the interconnecting channels report, which was a particularly important report, and further we were reorganizing the Upper Mississippi Valley-Great Lakes Division——

Senator KERR. That was brought about through compulsion, through legislation, was it not?

General STURGIS. Colonel Trower is a splendid officer and a great engineer, but he came under what is known as or referred to as the 30 and 5 law, meaning he completes 30 years of service and has been 5 years in his permanent grade, so that he would normally have been retired.

However, on my request that was waived, and he is being held for 9 months, which will be the 30th of June.

Senator CASE. Could you reemploy him as a civilian after retirement?

General STURGIS. We could, sir; but he can get such excellent offers that I am sure that he could do better.

Senator KERR. He will get 5 or 6 or 7 times as much as you could offer him, will he not?

General STURGIS. He could get at least 2 or 3 times.

Senator CASE. Maj. Gen. George Richards who used to be finance officer for the Defense Department had accepted the position of commissioner or chief for one of the State highway commissions.

General STURGIS. Pennsylvania; yes, sir.

Senator CASE. Do you know what salary? Is that a public salary?

General STURGIS. I do not know. I know it must be quite large. I was asked for a recommendation on General Richards, but I did not remember what the salary was.

But I do know the Governor of Pennsylvania wanted a strong man for that job, and so I was asked about General Richards.

Senator CASE. He was the finance expert, when I knew him, but at the same time he was an engineer; was he not?

General STURGIS. Most of his life he was an engineer.

Senator COTTON. How does the compensation of a civilian engineer compare with the compensation of an officer engineer of comparable age and experience?

General STURGIS. I can give you a pretty good illustration, if I may, on that, sir. I visited the Thule, Greenland, project.

Senator COTTON. I mean civilian employees for the Government, I am sorry. I am glad to have that other illustration, however.

General STURGIS. I thought you were speaking about officers.

Senator COTTON. I am glad to have that, too, but what I had in mind was the comparison between your civilian engineers and your officer engineers.

General STURGIS. I cannot give you the whole scale, but the starting pay for a second lieutenant a little over $200; the civilian is about $335 a month.

Senator KERR. That is for your civilian engineers?

General STURGIS. Yes, sir.

Senator KERR. What is it for the officers?

General STURGIS. They have just changed the pay scale, and I do not know offhand what a second lieutenant's pay is. I would say it is somewhere around $200 or $220.

Senator COTTON. There are certain benefits, such as retirement in later life that your officers have that your civilian professional employees would not have, are there not?

General STURGIS. I think one thing is quite important, and that is where 25 years ago, when we attracted as good a quality as there was,

private industry was not offering the emoluments for compensation, for retirement, which are in many cases today better than the Government, and that is affecting both the officers and the civilian employees.

Senator KERR. Is there a similarity between the salaries paid other professional personnel from civilian life in your department to the officer personnel?

Senator COTTON. That is it exactly, Mr. Chairman.

General STURGIS. I would say that the top civilian regular grade, GS–15, is pretty close to $11,000 whereas a brigadier general receives somewhere around $9,600 and a major general about $11,500. These figures do not include allowances.

Senator KERR. But you do not have very many of them, do you?

General STURGIS. Of that top grade, that is GS–15—but it does not include the supergrades, as we call them—we have only three supergrades in the entire Corps of Engineers.

Senator KERR. What is their salary base?

General ITSCHNER. The GS–16, which is the first and lowest of the supergrades has a starting salary of $12,000; the GS–17 has a starting salary of $13,000; and a GS–18, of which we have none, is $14,800 starting salary.

Senator KERR. What does a colonel get?

General STURGIS. A colonel gets now about $9,700, somewhere in there.

Senator KERR. Does that include his increase for length of service?

General STURGIS. Yes, that would be for about 30 years' service.

Senator KERR. That is comparable to a GS–13, is it not?

General ITSCHNER. About equivalent to a GS–15, $10,800 minimum.

Senator KERR. How many officers of a general grade do you have in the Corps?

General STURGIS. That varies, sir. Until recently we have only had about 28 until we got 5 more, and so we have 33.

Senator KERR. Does that include both major general and brigadier general?

General STURGIS. Yes; and that includes officers who are not directly under my command and are not directly in engineering positions.

Senator KERR. Are they professional engineers?

General STURGIS. Yes, sir; all of these are professional engineers, but they may be assigned to other work than engineering.

Actually, I have serving directly under me altogether only about 16 of that total number of 33, and only about 7 that are being used in connection with construction activities; for instance, General Wilson in North Africa; my deputy, General Robinson; General Tulley, chief of military construction; General Smith, chief of personnel; and in the divisions, General Holle and General Potter, and General Itschner, here with me, of course. I would say that altogether about 15 or 16 of the total of 33 are serving under me, about 7 or 8 of these directly on construction work. We have others serving in engineering positions, such as the chief engineer over in the Far East, but he is not under me; and the chief engineer in Europe, who is under the European command, not under me.

Then we have general officers who are serving in branch immaterial positions, over which I have no control, and who are not doing engineering work; such as General Chorpening, who used to be my

assistant for civil works but now is G–4, or deputy chief of staff for logistics for the Far East. The number I have available to me is relatively small.

Senator CASE. Are you charged with these generals assigned to other duties under the formula set up through the Armed Services Committee?

There is a limitation, what we call the Stennis formula, on the number of officers that can be had by the different services.

General STURGIS. I am sorry, Senator Case, I am not familiar with that.

Senator CASE. It really seemed to me that these general officers of the corps, if they are assigned to other duties, ought to be charged to the branch of the service with which they are identified and are actually serving.

General STURGIS. An attempt has been made to do that. For example, they are known as branch immaterial. If a man is serving in the staff, he would be so charged. We do have many jobs, Senator Case, like these.

Senator CASE. You have an engineer colonel now charged to the District of Columbia?

General STURGIS. That is charged to me.

Senator CASE. That is charged to you, but he is not doing any work with the corps?

General STURGIS. Yes.

Senator CASE. What about the Governor General of the Canal Zone?

General STURGIS. He also is charged to me.

Senator CASE. But he is not doing this type of work?

General STURGIS. No, sir.

Senator CASE. You ought not to be charged—that is your regular work of the corps ought not to be charged—for these officers that are loaned to the other agencies.

General STURGIS. Those positions which are not identified with any branch are known as Branch Immaterial positions, and when an officer goes to that group he is not charged against me; but there are certain positions that are known as Branch-Material positions where they serve as engineers, such as in Europe, where although not under my command, they are charged to me. Another example is Colonel Lane—going to be general, I think, very shortly, a very excellent officer who has had very wide experience. He was at Okinawa and was in the Little Rock district. As District Commissioner he is now charged to me, but is not under my command. If he were not so charged, then I could put up for general officer grade a position such as the Division Engineer of the Southwest Division, a very large division, with a great responsibility.

Senator CASE. Mr. Chairman, I would like to move that the staff ask the Secretary of the Army for a statement on this problem, and present the transcript to the attention of the Secretary of the Army where we have been discussing his problem this morning.

Senator KERR. Without objection, it is so ordered.

Proceed, General.

General STURGIS. Thank you. On the supergrades, sir, the entire civil works organization of the corps, although by far the biggest engineering organization in the Government, the country, and the

whole world, has only two of the so-called supergrades in face of the much larger numbers in agencies with far less workloads and in the face of one of the most if not the most serious professional shortage in the Nation.

Senator CASE. Mr. Chairman, I would like to state for the record that I thoroughly agree with General Sturgis in his estimate of the importance of the work of the Corps of Engineers and the figures that have been cited as to the present river and harbor and flood control and navigation responsibility for the Corps of Engineers, and a task which, if it were undertaken by private industry, would certainly have more men at the top of it—I am not going to refine it as to the quality of men—but would have more men than 10 drawing the salaries of the 3 supergrades and the 7 general officers.

It seems to me inconceivable that the Government should place as much dependence as it does upon the Corps of Engineers for carrying out the flood controls, the rivers and harbor projects, and the navigation projects, the studies and surveys, with only 10 men at the top of it in the grade of the supergrade classified service and 7 general officers.

Senator KERR. You could not be more right. The general started to tell us a while ago the comparison between the salaries of engineers on a project and the engineer of a construction company doing it.

General STURGIS. Yes; I thought the question was directed toward military personnel.

When I went to Thule, Greenland, in 1953, the last morning I was there—I spent about 10 days there—I had breakfast in the contractor's mess with a lieutenant colonel who was in charge of that $250 million project.

Senator KERR. Under your supervision?

General STURGIS. Yes, sir; that is under my direct supervision, that construction project.

The work at Thule has been very highly thought of by the Air Force, and I think by Members of Congress who have visited it.

The officer charged with this project was a lieutenant colonel known as project engineer, and we were served by a table waiter who was drawing $1,300 more a year than my lieutenant colonel in charge of the project.

I might say that the contractor's corresponding man in charge of the work got $35,000 a year plus bonuses, which were extremely substantial. Also he paid no income tax because of the fact that he had been out of the country for 17 months, whereas my officer did.

Senator GORE. There are some offsetting features. For one thing the waiter may have had a job for a very few months, and then unemployed, whereas your officer faced early retirement with a good pension to which he contributed nothing.

General STURGIS. He was a Reserve officer and out of the service as soon as he came back.

Senator GORE. Then my observation would not hold in that case, would it?

General STURGIS. No, sir.

Senator GORE. Too bad. But generally that is true, is it not?

General STURGIS. Generally it is true, but I do feel that that is a comparison which does have a tremendous effect, and it is why that I am beginning to lose so many men with around 20 years' service,

who are able to go into industry and draw a very fine salary, 2 or 3 times as much as they are drawing now.

Senator GORE. And still drawing a pension to which they are not contributing. I think we ought to put that law through a revision.

General STURGIS. The thing about it, sir, is that something will have to be done to attract men to stay in the service, particularly engineers, but I am sure that it is also quite applicable to many other fields in the rest of the Army.

Senator KERR. I would like to have the general put in the record the salary that the colonels draw.

General ITSCHNER. Yes, sir.

(The information requested is as follows:)

Pay and allowances of lieutenant colonels and colonels (18 to 30 years' service)

	Without dependents	With dependents
Lieutenant colonels	$9,107–$9,855	$9,517–$10,266
Colonels	10,622–11,745	10,827–11,951

Senator KERR. I think he presented us a problem, gentlemen, that has to be faced and solved or else we are going to be confronted with a crisis of phenomenal proportions in connection with this whole program.

Proceed, General.

General STURGIS. Thus, our top caliber people have a very definite and inadequate career ceiling imposed on them. I do not wish to draw comparisons, but as I said other Federal agencies have a much greater proportion of these supergrades in proportion to their workloads and responsibilities.

I cannot pay enough tribute to the faithful and highly competent group of officers and civil members of the corps—for instance, Mr. Hathaway who was president of the American Society of Civil Engineers a few years ago—who number among themselves many of the world's leading engineer specialists and whose habitual overtime and zeal are legend.

I do not believe it is the intention of this Nation to so circumscribe and level off the emoluments of the individual members of the Corps of Engineers so as to deprive our people during peace and war of what has been the strongest, most resourceful body of engineers in the world.

Yet, I must frankly state to you that this is bound to result if appropriate remedial measures are not soon taken.

At the present time, as to the future of our program, there is wide interest in water resource development, at Federal, State, and local level. In all my career, I have never seen more interest, more intense, more widespread, and more intelligent than I see today.

Even though we have a large backlog of authorized work not yet started, many new surveys have been authorized by Congress, and these will develop additional worthy improvements—particularly when the need for water is considered.

The President's Advisory Committee on Water Resources Policy, in which the Department of the Army is participating, and the task

force on water resources and power of the Hoover Commission are now actively engaged in studying basic policies affecting broad river basin planning, affecting the evaluation of projects and affecting the sharing of cost.

I am hopeful that those bodies direct their attention to deficiencies of the present, not the past, and to the problems of the future and that sound, realistic, and constructive recommendations will emerge so that the progress made so far may not only continue without interruption, but stay out in front of our expanding population and economy.

Our experience in handling this program over the years has convinced me of its great value to the Nation. It has also convinced me that there is no simple solution to some of the problems which are inherent with a program dealing with the Nation's basic natural resources.

I feel, however, that these problems can be solved in the public interest by close and effective cooperation between the States and local people, the Congress and the executive agencies charged with carrying out the work. And I assure you no organization individually, or as a group, are more anxious to efficiently serve Congress and the Nation in this respect than the Department of the Army and the Corps of Engineers.

Senator KERR. General, I want to congratulate you and thank you for your very able and comprehensive statement. Are there any questions, gentlemen?

Senator CASE. No questions, Mr. Chairman, but I would just like to second what you said in appreciation of the General's statement. It is the first time that I have heard that kind of a statement presented to a legislative committee. In fact, I do not even believe in the Appropriations Committee have I heard a statement that was quite as comprehensive about the work of the corps as a whole.

We generally have it piecemeal. It is a very fine statement.

Senator KERR. Senator Gore, do you have any questions?

Senator GORE. No, sir.

Senator KERR. Senator Neuberger?

Senator NEUBERGER. No, thank you, Mr. Chairman. I would likewise though—I am sorry I missed a few minutes of the statement which was very fine, and as General Itschner already knows, I come from a State that is very familiar with the work of the corps because we have a very long seacoast, and we have a lot of rivers where your group, your organization, has to do a great deal of important work.

We hope you will do some more work. We hope you will deepen our bar at the mouth of the Columbia River which a lot of our people think is very urgently needed.

I think you agree, but so far the appropriation has not been forthcoming.

Senator KERR. General Itschner, I believe you have a statement that you wish to make.

General STURGIS. If it is agreeable with you, may I withdraw at this time?

Senator KERR. Yes, and thank you very much.

STATEMENT OF BRIG. GEN. EMERSON C. ITSCHNER, ASSISTANT CHIEF OF ENGINEERS FOR CIVIL WORKS, CORPS OF ENGINEERS, DEPARTMENT OF THE ARMY

General ITSCHNER. Mr. Chairman, you sent us a letter on March 10, in which you listed 10 subjects you would like to have discussed at this hearing. General Sturgis has covered some points, so I will just fill in those things which he did not cover.

I think it might be appropriate if you would examine the tables that we gave you. We have 21 tables so it might be helpful to you if I went through them very quickly and pointed out the high points in those tables.

(The tables are as follows:)

TABLE I.—*Summary of status of the active civil-works program (Mississippi River and tributaries included as 1 project)*

[In millions of dollars]

	Number of projects or project authorizations	Estimated cost (1954)	Appropriations through fiscal year 1955	Required to complete
Completed or substantially completed	2,218	3,084	3,048	36
Under construction	171	6,116	3,417	2,699
Authorized, not started	695	6,032	26	6,006
Total	3,084	15,232	6,491	8,741

[In millions of dollars]

	Number	Cost to complete
Deferred for restudy	172	2.6
Inactive	248	1.1
Total deferred and inactive	420	3.7

TABLE II.—*Distribution of river and harbor appropriations (through fiscal year 1954)*

[In millions of dollars]

	New work	Maintenance and operation	Total
Seacoast harbors	826.7	585.8	1,412.5
Great Lakes harbors and channels	233.9	172.1	406.0
Inland and intracoastal waterways	1,444.0	651.9	2,095.9
	2,504.6	1,409.8	3,914.4
Surveys, emergency work, and regulatory functions		285.8	285.8
Total	2,504.6	1,695.6	4,200.2
Percent	60	40	100

TABLE III.—*Summary of status of navigation construction program, end fiscal year 1954*

[In millions of dollars]

	Number of projects	Estimated Federal cost, 1954	Funds appropriated through fiscal year 1954	Required to complete
1. Active program:				
(a) Navigation:				
Complete	1,865	1,341.6	1,308.7	32.9
Under construction	79	1,002.0	469.0	533.0
Not started	347	1,276.8	3.2	1,273.6
Total navigation	2,291	3,620.4	1,780.9	1,839.5
(b) Multiple purpose:				
Complete	4	234.4	232.9	1.5
Under construction	7	925.0	475.0	450.0
Not started	12	1,415.4	4.0	1,411.4
Total multiple-purpose	23	2,574.8	711.9	1,862.9
Total active	2,314	6,195.2	2,492.8	3,702.4
2. Inactive or deferred for restudy:				
Navigation	104	1,112.6	10.9	1,101.7
Multiple-purpose	6	390.2	.9	389.3
	110	1,502.8	11.8	1,491.0
3. Total authorized program	2,424	7,698.0	2,504.6	5,193.4

TABLE IV.—*Coastal ports handling 10 million tons or more of commerce in 1953*

[In millions of tons]

New York, N. Y.-N. J	139.4	Lake Charles, La	15.9
Delaware River, Pa., N. J., Del	73.4	Baton Rouge, La	15.8
Houston, Tex	44.3	Texas City, Tex	14.8
Baltimore, Md	41.8	Corpus Christi, Tex	13.5
New Orleans, La	39.6	Mobile, Ala	13.1
San Francisco Bay, Calif	37.7	Newport News, Va	12.3
Norfolk, Va	24.1	Seattle, Wash	11.9
Beaumont, Tex	23.4	Portland, Maine	11.7
Port Arthur, Tex	22.3	Portland, Oreg	11.7
Los Angeles, Calif	19.7	Port Aransas, Tex	10.0
Boston, Mass	18.1		

TABLE V.—*Great Lakes ports handling 10 million tons or more of commerce in 1953*

[In millions of tons]

Duluth-Superior, Minn.-Wis	77.2	Indiana Harbor, Ind	20.0
Chicago, Ill	38.3	Buffalo, N. Y	22.0
Toledo, Ohio	31.6	Conneaut, Ohio	16.1
Detroit, Mich	25.5	Ashtabula, Ohio	15.2
Two Harbors, Minn	23.6	Lorain, Ohio	11.8
Cleveland, Ohio	23.5		

TABLE VI.—*Economic status of inland and intracoastal waterways, 1953*

[In millions of dollars]

(a) Annual charges:	
(1) Interest at 2½ percent and amortization in 50 years on the total of $1.1 billion	39
(2) Maintenance and operation	40
Total	79
(b) Annual transportation savings (using a unit saving of 5 mills per ton-mile rather than the 9.18 mills overage for the major waterways), 50 billion tan-miles x 5 mills	250
(c) Benefit-cost ratio for 1953	3.17

TABLE VII.—*Economic justification of major waterways*

Waterway:	*Ratio of benefits to costs, 1953*	Waterway—Continued	*Ratio of benefits to costs, 1953*
Gulf Intracoastal	14.8	Middle Mississippi	4.4
Lower Mississippi	9.5	Cumberland	3.6
Monongahela	9.4	Warrior	3.1
Illinois	8.1	Kanawha	2.9
Ohio	7.3	Upper Mississippi	2.1
Sacramento	5.3	Allegheny	1.4

TABLE VIII.—*1953 traffic and annual charges, major coastal ports*

Harbor	1953 traffic (millions of tons)	1953 annual charge			Cost per ton
		Interest and amortization (thousands)	1953 maintenance cost (thousands)	Total (thousands)	
Port of New York	139.4	$4,081	$2,123	$6,204	$0.045
Delaware River	73.4	1,252	2,733	3,985	.054
Houston	44.3	522	715	1,237	.026
Baltimore	41.8	346	278	624	.015
Mississippi River-Baton Rouge to gulf:					
New Orleans	39.6	892	1,807	2,699	.049
Baton Rouge	15.8				
Port of San Francisco	37.7	212	818	1,030	.027
Norfolk	24.1	228	174	402	.017
Sabine-Neches Waterway	56.7	551	754	1,305	.023
Beaumont (included in waterway)	(23.4)				
Port Arthur (included in waterway)	(22.3)				
Los Angeles	19.7	1,070	[1] 125	1,195	.061
Boston	18.1	506	124	630	.035
Lake Charles [2]	15.9	258	[1] 282	540	.034
Texas City	14.8	82	[1] 164	246	.017
Port Aransas-Corpus Christi Waterway	23.5	230	403	633	.027
Corpus Christi (included in waterway)	(13.5)				
Port Aransas (included in waterway)	(10.0)				
Mobile	13.1	42	475	517	.039
Newport News	12.3	44	[1] 13	57	.005
Seattle	11.9	6	[1] 59	65	.005
Portland, Maine	11.7	70	[1] 40	110	.009
Portland, Oreg. [3]	11.7	198	[1] 1,604	1,802	.154
Total	625.5	10,590	12,691	23,281	.037

[1] Current estimate of annual maintenance.
[2] Data for Calcasieu River and Pass.
[3] Data for Columbia and lower Willamette Rivers below Portland.

NOTES.—Data obtained generally from 1953 maintenance study and supplemented from annual report.

TABLE IX.—*1953 traffic and annual charges, major Great Lakes ports*

	1953 traffic, (millions of tons)	Interest and amortization, (thousands)	1953 maintenance cost, (thousands)	Total, (thousands)	Cost per ton
Great Lakes harbors:					
Duluth-Superior, Minn.-Wis	77.2	$147	$220	$367	$0.005
Chicago, Ill	38.3	69	57	126	.003
Toledo, Ohio	31.6	165	312	477	.015
Detroit, Mich	25.5	761	167	928	.036
Two Harbors, Minn	23.6	117	4	121	.005
Cleveland, Ohio	23.5	581	633	1,214	.052
Indiana Harbor, Ind	20.0	129	41	170	.008
Buffalo, N. Y	22.0	168	304	472	.021
Conneaut, Ohio	16.1	115	164	279	.017
Ashtabula, Ohio	15.2	91	165	256	.017
Lorain, Ohio	11.8	91	206	297	.025
Totals	304.8	2,434	2,273	4,707	.015

NOTE.—Data obtained from 1953 maintenance study.

TABLE X.—*Current use and economic status of 12 major active waterways*

	Length (miles)	1st cost through fiscal year 1953 [1]	Annual cost, 1953			Traffic and savings				
			Amortization	Maintenance and operation	Total annual charge	Tons (millions)	Ton-miles (billions)	Unit savings (mills/ton-mile)	Total savings (millions of dollars)	1953 benefit-cost ratio
Gulf intracoastal	1,367	53.8	1.9	3.7	5.6	41.7	7.4	11.2	83.2	14.8
Lower Mississippi	736	200.0	7.1	4.5	11.6	24.2	12.0	9.1	109.9	9.5
Monongahela	128	35.5	1.3	1.5	2.8	33.4	1.6	16.0	25.6	9.4
Illinois	336	28.4	1.0	1.9	2.9	20.1	3.3	6.9	23.1	8.1
Ohio	981	128.2	4.5	7.9	12.4	62.0	11.8	7.7	90.5	7.3
Sacramento	245	12.8	.5	.4	.9	2.0	.12	35.8	4.4	5.3
Middle Mississippi	195	80.3	2.8	1.8	4.6	15.9	2.4	8.4	20.0	4.4
Cumberland	513	8.8	.3	.7	1.0	2.5	.29	12.4	3.6	3.6
Warrior	472	25.3	.9	.9	1.8	2.9	.65	8.4	5.5	3.1
Kanawha	91	22.9	.8	.3	1.1	7.4	.39	8.2	3.2	2.9
Upper Mississippi	663	161.7	5.7	4.4	10.1	14.7	2.6	8.1	21.4	2.1
Allegheny	72	18.4	.6	.4	1.0	3.7	.07	19.1	1.4	1.4
Total	5,799	776.1	27.4	28.4	55.8	230.5	42.62	[2] 9.2	391.8	[2] 7.0

[1] 1st cost is exclusive of old work superseded and not part of current project.
[2] August.

TABLE XI.—*Status of flood control construction program, end fiscal year 1954*

	Number of projects	New work in millions of dollars		
		Estimated Federal cost, 1954	Funds appropriated through fiscal year 1954	Required to complete
1. Active program:				
(a) Flood control:				
Complete	335	893.4	891.7	1.7
Under construction	72	2,919.7	1,396.1	1,523.6
Not started	276	2,051.5	12.4	2,039.1
Total flood control	683	5,864.6	2,300.2	3,564.4
(b) Multiple-purpose:				
Complete	14	614.5	614.0	.5
Under construction	12	1,269.4	738.4	531.0
Not started	14	1,272.6	3.1	1,269.5
Total multiple-purpose	40	3,156.5	1,355.5	1,801.0
Total active	723	9,021.1	3,655.7	5,365.4
2. Inactive or deferred:				
Flood control	301	1,611.2	6.0	1,605.2
Multiple-purpose	9	504.3	3.7	500.6
Total	310	2,115.5	9.7	2,105.8
3. Total authorized program	1,033	11,136.6	3,665.4	7,471.2

TABLE XII.—*Estimated effect of Federal flood control program (July 1954 price levels and conditions of development)*

Region	Average annual flood damages (in millions of dollars)					
	Potential without Federal works	To be prevented by works—			Total	Remainder
		In full or partial operation	Under construction not in operation	Authorized but not started		
New England	21.0	7.3		4.5	11.8	9.2
North Atlantic	47.9	15.3	5.3	10.8	31.4	16.5
South Atlantic [1]	32.0	8.1	.1	.6	8.8	23.2
Lower Mississippi Valley	218.5	214.6			214.6	3.9
Upper Mississippi Valley [2]	119.1	75.5	2.0	13.8	91.3	27.8
Red River of the North	2.6	.8	.2	.4	1.4	1.2
Ohio River Basin	112.0	46.6	10.0	34.3	90.9	21.1
Great Lakes Basin	11.5	2.1	.1	.6	2.8	8.7
Missouri River Basin [2]	60.0	28.8	10.3	18.8	57.9	2.1
Arkansas-White-Red	52.3	26.6	2.3	5.6	34.5	17.8
Gulf Southwest	55.4	11.7	1.0	14.7	27.4	28.0
Pacific Southwest	111.6	34.7	51.3	12.1	98.1	13.5
Pacific Northwest	67.1	19.3	.8	21.0	41.1	26.0
Total United States	911.0	491.4	83.4	137.2	722.0	199.0

[1] Flood damages and benefits being reevaluated for entire central and southern Florida project.
[2] Flood damages and benefits being reevaluated to include data obtained during 1951 and 1952 floods. Values may be materially higher.

TABLE XIII.—*Flood damages prevented through June 30, 1954, by Federal projects in full or partial operation*

[Cumulative in millions of dollars]

Region	Number of projects in operation	Average number of years in operation	Total Federal appropriations for new work through June 30, 1954	Accumulated flood damages prevented
New England	23	8.7	52.4	64.3
North Atlantic	34	9.7	175.4	[1] 82.1
South Atlantic	11	10.0	127.7	58.6
Lower Mississippi Valley:				
Alluvial Valley	4	27.0	849.9	5,000.0
Other	2	7.0	16.4	.9
Total lower Mississippi Valley	6	20.3	866.3	5,000.9
Upper Mississippi Valley	61	23.5	73.7	254.8
Red River of the North	3	1.7	10.5	3.3
Ohio River Basin	76	8.0	470.5	[2] 205.0
Great Lakes Basin	8	3.6	31.7	2.1
Missouri River Basin	26	12.0	448.0	975.0
Arkansas-White-Red	36	9.0	431.2	97.6
Gulf Southwest	17	2.3	141.3	[3] .9
Pacific Southwest	17	7.2	149.1	453.3
Pacific Northwest	73	9.5	226.6	118.0
Grand total	391	11.0	3,204.4	7,315.9

[1] Does not include estimated $5.0 million damages prevented during Hurricane Hazel in October 1954.
[2] In addition, Ohio Basin projects operated during the October 1954 and March 1955 floods prevented flood damages estimated at $164.0 million and $69.0 million, respectively. (Total $233.0 million in 6-month period.)
[3] Projects have been in operation during period of severe drought.

TABLE XIV.—*Economic analysis of Federal flood-control projects in full or partial operation*

[In millions of dollars]

Region	Estimated first cost (July 1954 estimate)			Average annual charge	Average annual benefits based on July 1954 conditions and price levels			Benefit-cost ratio
	Federal	Local	Total		Flood damages prevented	Other	Total	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
New England	53.9	5.1	59.0	2.7	7.3	.....	7.3	2.5
North Atlantic	180.4	5.0	185.4	9.0	15.3	5.9	21.2	4.0
South Atlantic	222.6	33.0	255.6	13.2	8.1	41.9	50.0	3.8
Lower Mississippi Valley	1,347.8	42.3	1,390.1	64.9	214.6	98.8	313.4	4.8
Upper Mississippi Valley	119.0	19.8	138.8	5.5	75.5	.....	75.5	13.7
Red River of the North	10.6	.7	11.3	.5	.8	.4	1.2	2.4
Ohio River Basin	476.9	17.3	494.2	21.1	46.6	15.7	62.3	3.0
Great Lakes	31.7	4.4	36.1	1.4	2.1	.2	2.3	1.6
Missouri River Basin	669.1	26.1	695.2	33.5	28.8	29.1	57.9	1.7
Arkansas-White-Red	636.3	11.1	647.4	32.4	26.6	24.5	51.1	1.6
Gulf Southwest	159.1	14.0	173.1	7.5	11.7	5.6	17.3	2.3
Pacific Southwest	170.4	111.7	282.1	12.0	34.7	9.0	43.7	3.6
Pacific Northwest	247.2	1.7	248.9	12.0	19.3	11.2	30.5	2.5
Grand total	4,325.0	292.2	4,617.2	215.7	491.4	242.3	733.7	3.4

TABLE XV.—*Status of authorized civil works examinations and surveys*

Reports in active program	882
Cost	$47,343,000
Appropriated through fiscal year 1955	26,732,000
Required to complete	20,611,000
Appropriated in fiscal year 1955	2,337,500
Requested in fiscal year 1956	1,750,000

TABLE XVI.—*Rate of progress on authorized examinations and surveys*

Fiscal year	Number of authorizations—navigation and flood control [1]				
	Backlog	Ordered	Total	To Congress	Remaining
1953	1,456	46	1,502	65	1,437
1954	1,437	60	1,497	107	1,390
1955	1,390	[2] 70	[2] 1,460	[2] 175	[2] 1,285
1956	[2] 1,285	[2] 75	[2] 1,360	[2] 117	[2] 1,243

Fiscal year	Number of beach erosion cooperative studies				
	Backlog	Ordered	Total	To Congress	Remaining
1953	34	6	40	11	29
1954	29	6	35	15	20
1955	20	[2] 11	[2] 31	[2] 6	[2] 25
1956	[2] 25	[2] 11	[2] 36	[2] 13	[2] 23

[1] The number of authorizations exceed number of reports as several authorizations may be combined in a single report.
[2] Estimated.

TABLE XVII.—*Status of outstanding resolutions—Senate Public Works Committee*

Reports completed and referred to Bureau of the Budget for comment	14
Reports before the Board of Engineers for Rivers and Harbors	7
Reports referred to Federal and State Agencies for comment	7
Reports being processed by Office Chief of Engineers	7
Studies being prosecuted in the field	90
Studies not started or generally inactive in the field	169
Total	294

TABLE XVIII.—*Data on hydroelectric power installations at Corps of Engineers' projects as of Jan. 1, 1955*

Project	Completed projects							Installations after fiscal year 1960
	Capacity (1,000 kilowatts)	Scheduled installations (1,000 kilowatts) by fiscal years						
		1955 [1]	1956	1957	1958	1959	1960	
Completed:								
Allatoona, Ga	74							36
Bonneville, Oreg. and Wash	518.4							
Bull Shoals, Ark. and Mo	160							160
Center Hill, Tenn	135							
Clark Hill, Ga. and S. C	280							
Dale Hollow, Tenn	54							
Denison, Okla. and Tex	70							105
Detroit, Oreg	118							
Fort Gibson, Okla	45							22.5
Fort Peck, Mont	85							80
John H. Kerr, N. C. and Va	204							
Narrows, Ark	17							8.5
Norfolk, Ark. and Mo	70							70
Philpott, Va	14							
St. Mary's River, Mich	18.4							
Tenkiller Ferry, Okla	34							
Whitney, Tex	30							
Wolf Creek, Ky	270							
Total	2,196.8							482

[1] Scheduled after Jan. 1, 1955.

TABLE XIX.—*Data on hydroelectric power installations at Corps of Engineers' projects, as of Jan. 1, 1955*

Project	Projects under construction							Installations after fiscal year 1960
	Capacity (1,000 kilowatts)	1955 [1]	1956	1957	1958	1959	1960	
Under construction:								
Albeni Falls, Idaho		28.4	14.2					
Blakely Mountain, Ark		75						
Buford, Ga				86				
Cheatham, Tenn					36			
Chief Joseph, Wash			384	256	256	128		256
Fort Randall, S. Dak	160	40	120					
Garrison, N. Dak		80	160					160
Gavins Point, Nebr. and S. Dak				100				
Jim Woodruff, Fla				30				
Lookout Point, Oreg	40	95						
McNary, Oreg. and Wash	420	140	280	140				
Oahe, N. Dak. and S. Dak								425
Old Hickory, Tenn			25	75				
Table Rock, Ark. and Mo						100		100
The Dalles, Oreg. and Wash					312	312	312	312
Total	620	458.4	983.2	687	604	540	312	1,253
Total, completed and under construction	2,816.8	458.4	983.2	687	604	540	312	1,735

[1] Scheduled after Jan. 1, 1955.

TABLE XX.—*Water supply storage provided by Corps of Engineers*

No.	Reservoir	Water supply storage, acre-feet	Contractor	Towns served
1	San Angelo, Tex. (Fort Worth district).	80,351	Upper Colorado River Authority.	San Angelo, Tex.
2	Berlin Dam, Ohio (Pittsburgh district).	19,400	Mahoning Valley Sanitary district.	Youngstown, Ohio, and Niles, Ohio (contract not yet operative).
3	Mosquito Creek, Ohio (Pittsburgh district).	11,000	Warren, Ohio	Warren, Ohio.
4	Burr Oak, Ohio (Huntington district).	9,300	State of Ohio	Towns, industries, and mines in Sunday Creek Valley.
5	Hords Creek, Tex. (Fort Worth).	5,780	Coleman, Tex	Coleman, Tex.
6	Garza-Little Elm, Tex. (Fort Worth).	415,000	Dallas	Dallas.
6	Do	21,000	Denton	Denton.
7	Grapevine, Tex. (Fort Worth district).	85,000	Dallas	Dallas.
7	do	50,000	Park cities	Highland Park and University Park.
7	do	1,250	Grapevine	Grapevine.
8	Lavon, Tex. (Fort Worth district).	100,000	North Texas municipal water district.	Farmersville, Princeton, McKinney, Pland, Wylie, Royse City, Rockwall, Garland, Mesquite, and Forney.
9	Delaware, Ohio (Huntington).	5,700	Columbus, Ohio	
10	Texarkana, Ark. and Tex. (New Orleans district).	13,400	Cities of Texarkana	Texarkana, Tex. and Texarkana, Okla.
11	Lake Texoma (Denison), Tex. and Okla. (Fort Worth).	21,300	Denison	Denison.
12	Ferrells Bridge, Tex. (New Orleans district).	250,000	Northeast Texas municipal water district (in negotiation).	
13	Belton, Tex	113,700 12,000	Brazos River Authority (in negotiation) Fort Hood (authorized).	Killeen and others.
14	Canton, Okla. (Tulsa district).	38,000	No contract in force	Set up for Enid, Okla. Negotiations under way to serve Oklahoma City temporarily.
15	Clark Hill, Ga. and S. C. (Savannah district).	(1)	McCormick, S. C. (Negotiations under way).	McCormick, S. C. (to provide 600 acre-feet annually).
	Total	1,252,181		

[1] Not yet determined.

TABLE XXI.—*Status of basin authorizations and appropriations*

[In thousands of dollars]

Basin or project	Present estimated cost	Monetary authorization	Appropriations through fiscal year 1955	Remaining authorization	Approved budget fiscal year 1956	Remaining authorization after fiscal year 1956
Connecticut	179,184	72,957	35,018	37,939	423	37,516
West branch Susquehanna	63,360	25,000		25,000	40	24,960
Hartwell Reservoir	94,300	50,000	952	49,048		49,048
Central and southern Florida	221,000	43,300	23,024	20,276	6,300	13,976
Arkansas	549,173	305,923	106,450	199,473	2,800	196,673
White	339,850	169,000	123,218	45,782	11,000	34,782
Brazos	155,076	40,000		40,000	100	39,900
Upper Mississippi	352,305	44,300	27,831	16,469	5,275	11,194
Ohio	1,818,331	659,175	476,857	182,318	2,879	179,439
Cumberland	167,000	36,000	85	35,915	200	35,715
Missouri	1,712,813	833,710	578,921	254,789	67,740	187,049
South Platte	65,010	26,300	30	26,270	10	26,260
Russian	16,600	11,522	546	10,976		10,976
Kaweah	30,400	4,600	745	3,855	110	3,745
San Joaquin	74,900	15,500	8,936	6,564	785	5,779
Sacramento	125,530	18,500	2,589	15,911	50	15,861
Los Angeles	395,300	210,041	160,993	49,048	14,933	34,115
Santa Ana	54,607	35,500	26,019	9,481	1,280	8,201
Columbia	1,801,618	463,300	272,791	190,509	65,283	125,226
Quachita	52,156	21,300		21,300		21,300
Alabama-Coosa	110,170	60,000	1,654	58,346		58,346
Arkansas (navigation)	909,700	70,850	17,969	52,881	3,000	49,881
Total	9,288,383	3,216,778	1,864,628	1,352,150	182,208	1,169,942

Table I is a summary of the status of the active civil-works program, including both navigation and flood-control projects. It gives separately data for completed or substantially completed projects; projects under construction; and projects authorized but not started.

You will see the total is 3,084 projects. Cost is estimated to be $15,232 million; the appropriations through 1955 have been $6,491 million; and $8,741 million is required to complete them.

Those totals and that number of projects do not include those deferred for restudy or the inactive projects which are given at the bottom of that table. Those total 420 projects, and the cost to complete them is $3,700,000.

I plan to cover later the matter of categorizing projects as deferred for restudy and inactive when I discuss the backlog of projects, which you have asked me to cover.

Tables II through X refer to the navigation program.

Table II is a distribution of river and harbor appropriations broken down into seacoast harbors, Great Lakes, and inland waterways. It is interesting to notice that seacoasts have had 36 percent of the entire appropriations for navigation, Great Lakes, 10 percent; and inland waterways, 54 percent.

Table III has been discussed. It is a summary of the status of the navigation-construction program. You notice that the active program is given as $6,195 million, as a total estimated cost, which is 80 percent of the entire program; whereas the inactive and deferred for restudy category is 20 percent of the amount, or $1,502 million.

Table IV lists the 21 ports on the coast of the United States that have 10 million or more tons of commerce every year. Out of these 21 ports, 9 are ports that deal almost entirely in petroleum products. You notice that New York is by a substantial margin the largest port in the country.

Table V gives the Great Lakes ports handling 10 million tons or more of commerce in 1 year. You, Mr. Chairman, brought out that Duluth-Superior is the No. 2 port in the Nation, exceeded only by New York.

Of course, most of the Great Lakes ports are handling ores.

Table VI is an economic analysis of the inland and intracoastal waterways of the Nation.

Senator KERR. Is that based on actual experience?

General ITSCHNER. That is based on actual costs and the estimated savings in ton-miles accruing to traffic and actually experienced traffic.

Senator KERR. This table is not an estimate but the result of experience?

General ITSCHNER. That is correct.

Senator KERR. Would you be able to tell me how that compares with the figures used in the estimates used to recommend authorization to Congress?

General ITSCHNER. If I may, sir, I would like to submit that for the record.

Senator KERR. You will put that in the record?

General ITSCHNER. Yes, sir; we will put that in the record.

(The information requested is as follows:)

The basic improvements of most of these inland waterways were authorized and constructed generally many years ago prior to adoption of procedures for estimating prospective commerce and evaluation of the transportation savings that would result therefrom. Accordingly, benefit-to-cost ratios were not presented in the reports recommending those improvements and are not available for comparison with current evaluations. Improvements were conservatively justified based on existing commerce and in consideration of the general effect which low-cost water transportation would have on the regional and national economy. It was, of course, recognized that the improved navigation facilities would promote large amounts of additional waterborne commerce; however, estimates were not generally made to allow for such future growth. Considering the significant growth of traffic on the inland waterways in recent years, it is apparent that the justification of those improvements greatly exceeds what might have been expected at the time of authorization.

More recent recommendations of the Corps of Engineers, though more fully supported by detailed traffic studies, are likewise highly conservative. The ten major navigation improvements authorized by the 1954 River and Harbor Act had an average benefit-to-cost ratio of 1.6 to 1. Based on past experience, it can be expected that those projects will have an even greater justification once traffic has been given the opportunity to develop.

General ITSCHNER. Table VII is the economic justification of major waterways and shows the ratio of benefits to costs, the highest being 14.8 to 1.

Senator KERR. This is also based on experience?

General ITSCHNER. Yes, sir.

Senator KERR. Would you put into the record with these figures based on experience compared with the figures used in the estimates used to recommend authorization to Congress?

General ITSCHNER. Yes, sir; we will insert that in the record for table VII.

(The information requested is as follows:)

As previously mentioned, benefit-to-cost ratios were not presented in the reports of the Corps of Engineers recommending initial improvement of these waterways. Some of the reports, however, included estimates of anticipated

traffic which are shown below for comparison with actual traffic on those waterways in 1953.

Project	Year estimate made	Opened to traffic	Traffic (in millions of tons)	
			Anticipated traffic	Actual 1953 traffic
Upper Mississippi	1930	1940	9.0	14.7
Illinois Waterway	1926	1939	7.5	20.1
Gulf Intracoastal Waterway:				
New Orleans to Corpus Christi	1945	1949	7.0	41.7
New Orleans to Mobile	1941	1944	2.9	
Kanawha River	1931	1937	2.3	7.4

The above are the only waterways listed in table VII for which estimates of traffic were made. In all fairness, it is recognized that the phenomenal growth of traffic on the Gulf Intracoastal Waterway is not typical. The data given for the other waterways is considered to represent conditions on all of the waterways listed in table VII.

The traffic tabulated under the heading "Anticipated" is the amount of traffic that was estimated would be experienced when the waterway matured, and was the figure used in an economic analysis to justify the waterway.

General ITSCHNER. Table VIII is the annual traffic and annual charges at the major coastal ports. It is interesting to note that the cheapest ports of all are Newport News and Seattle, which have a cost of approximately 5 mills per ton using the harbor.

It goes on up from that point to New York harbor, which has 4½ cents per ton as the computed cost.

Senator KERR. Where is that to be found?

General ITSCHNER. Those figures are not shown in the table. They are derived figures from the data given here. They are obtained by dividing the total cost by the number of tons.

Senator KERR. You mean it is obtained by dividing, the annual charge, interest, and amortization, and maintenance, and totaled, by the number of tons?

General ITSCHNER. Yes; with the traffic in millions of tons, which is the first column of figures on that page.

Senator KERR. I wonder if it would be possible to just add another copy to this table to put in the record.

General ITSCHNER. Yes; it can be done. We will substitute a new table for the one that we have here.

Senator KERR. Good.

(NOTE: Information has been inserted in lieu of original table VIII—see tables attached.)

General ITSCHNER. Some of the ports run up to a substantial charge per ton, but still very decidedly justified economically.

The port of Portland is the highest on this list, with a charge of 15.4 cents per ton. There are other ports having less total traffic, which are higher than that and they run up as high as 38.5 cents per ton for a major port.

Table IX gives the traffic and annual charges for the 11 major Great Lakes ports having over 10 million tons of traffic per year. Here again, I think it would be desirable, sir, to modify the table to give the same figures that we had on table No. VIII, but I will say that the cheapest port listed is Chicago, with a charge of only 3 mills

per ton, and the port of Duluth-Superior comes next with 5 mills per ton, and the port of Cleveland is the most, but still it is only 5.2 cents per ton.

Table X, Mr. Chairman, is the last of the navigation tables. It shows the current use and economic status of 12 major active waterways. An interesting column in this table is the column a little past the center of the page, giving the traffic in millions of tons. We find there that the Ohio River Waterway has 62 millions tons of traffic, or the greatest in tonnage in the Nation, followed by the Gulf Intracoastal, with 41,700,000 tons; by the Monongahela, with 33,400,000 tons; and the lower Mississippi, with 24,200,000 tons.

Senator KERR. Is the Monongahela a part of what goes into the Ohio?

General ITSCHNER. The Monongahela is a tributary of the Ohio at Pittsburgh.

Senator KERR. That is what I thought, and the 33.4 is a part of the 62 then?

General ITSCHNER. No, sir; it is to be added on to the 62 and also the Allegheny would have to be added on also.

Nor are the figures for the Mississippi inclusive of the Ohio or any of its tributaries.

Now, the next column is perhaps an even more significant one: The number of ton-miles, because some of the waterways are short and others are long.

On this basis the figures are given in billions of ton-miles, and the Lower Mississippi is a leader with 12 million ton-miles in one year, followed closely by the Ohio with 11,800,000 ton-miles, and the third by the Gulf Intracoastal with 7,400,000 ton-miles.

The last column gives the benefit to cost ratio, and we find that the Gulf Intracoastal has that 14.8 benefit-cost ratio, which we have previously discussed.

Table XI is the first of the tables on flood control, which go up through table XIV. This table is identically the same as table III for navigation with flood control figures instead of navigation. The total number of projects for flood control is 723.

Senator KERR. That is they are active?

General ITSCHNER. Yes, sir; active. The estimated Federal cost is $9,021,000,000.

Funds appropriated through 1954 were $3,656,000,000; and there is required to complete these active projects $5,365,000,000.

To these again must be added the inactive or the deferred projects, which comprise about 19 percent of the total in cost. Notice the flood control program is a substantially greater program than the navigation program.

Passing to table XII, it shows the estimated effect of the Federal flood control program, and it shows the United States divided into 13 areas, so the entire United States is covered.

It gives the average annual flood damages in millions of dollars. As can be seen, going only through the total now, without breaking it down, as shown by the table, the total potential flood damage in one year without Federal flood control projects is $911 million.

We have in full or partial operation projects which prevent $491 million of damage from floods each year and some projects under construction, but not in operation, which we estimate would prevent

damages amounting to $83 million per year, and from those projects which are authorized but not yet started $137 million of flood damage per year.

Senator KERR. Does that include only the active projects, or does the tabulation showing authorized but not started include both active and inactive?

General ITSCHNER. It is only the active projects, sir. The total then of the damage that would be prevented by all authorized projects, whether they have been started or not, in the active category is $722 million; and it is estimated that the difference between that $722 million and the $911 million, or $199 million of flood damage which remains after the authorized program is completed, that $199 million of remaining flood damage is the field for future authorized projects.

In addition, there are upland watershed losses, according to the Department of Agriculture, not covered in this table, which will average in annual damages $300 million.

In addition, there are losses to topsoil, losses of that nature, which are not included in this figure, nor in the $300 million in the Department of Agriculture's estimate.

Table XIII shows the flood damages prevented by actual experience, by Federal projects in full or partial operation, through June 30, 1954.

We have discussed this table to some extent. You notice that the lower Mississippi Valley has the largest amount, which is $5 billion, and leads the others by a considerable margin.

The Missouri Basin is second, with $975 million, followed by the Pacific Southwest, with $453 million.

The upper Mississippi is next, with $255 million, and the next is the Ohio River Basin, with $205 million, to date actually prevented.

Table XIV, which is the next table and the last of the flood-control tables, shows the economic analysis of Federal flood-control projects in full or partial operation.

It is much the same as the companion table in the navigation series, and shows in the last column the benefit-cost ratio in the various parts of the country for the flood-prevention program.

The grand total is given as 3.5. It should be revised to 3.4, due to a minor change we have made in the table. You notice that all of the areas of the country have a favorable benefit-cost ratio.

The least is 1.6 and the greatest is 13.7, instead of the 18.5 shown on your table.

That concludes my discussion, sir, of the tables. There are other tables which I would like to discuss when we discuss the particular subjects which you asked us to cover.

Senator KERR. Do you want to continue?

General ITSCHNER. It is entirely up to you, sir. It would take about 45 minutes to complete.

Senator KERR. Who is here in connection with S. 15 and S. 1340?

General ITSCHNER. That is Mr. Pearl of our Real Estate Division.

Senator KERR. Are there any other than the corps to be heard on these bills?

General ITSCHNER. None that we know of, sir.

Senator KERR. What would you think about reconvening at 2:30?

General ITSCHNER. That would be fine.

Senator KERR. Very well, the committee stands adjourned until 2:30.

(Thereupon, at 12:20 p. m., the committee was adjourned to reconvene at 2:30 p. m., the same date and place.)

AFTERNOON SESSION

Senator KERR. Come to order, gentlemen. All right, General.

General ITSCHNER. Mr. Chairman, with your permission I would like to introduce the gentlemen who are here with me this afternoon.

We have Captain Lathrop, Legislative and Liaison Division; Mr. Hertzler, Assistant to the Assistant Secretary of the Army, Mr. Roderick; we have Colonel Starbird, Assistant for Flood Control; Mr. Page, Chief of the Planning Division; Mr. Kinney, Chief of the Policy Branch of the Planning Division; Mr. Brennan, Chief of the Survey Branch of the Planning Division; Mr. Van, assistant to Mr. Brennan in the Survey Branch; and Mr. Pearl, of the Real Estate Division.

Mr. Chairman, I shall proceed now, with your approval, to discuss the various subjects that you brought up in the letter of the 10th of March.

Senator KERR. Yes, sir.

General ITSCHNER. I would like to start, if you please, with the table XV, which gives the status of the authorized civil works examination and surveys program.

You will notice that there are in the active program 882 surveys.

Senator KERR. May I?

General ITSCHNER. Yes, sir.

Senator KERR. Those are surveys which have been ordered by resolution of the appropriate committee of 1 of the 2 branches of the Congress?

General ITSCHNER. Yes, sir; or directed in an omnibus bill.

Senator KERR. Yes, sir. Would you have an opinion as to how many of them are individual surveys ordered and how many of them are surveys ordered in a general bill?

General ITSCHNER. I cannot give you that offhand, sir.

Senator KERR. All right.

General ITSCHNER. I can say that only 23 percent of them are resolutions from the Senate and of the rest, some are from the House and the others are directed by bill.

Senator KERR. All right.

General ITSCHNER. The total cost of accomplishing these studies is $47,343,000 of which $26,732,000 has been appropriated through fiscal year 1955. The amount required to complete these studies is $20,611,000.

We had appropriated for this purpose in fiscal year 1955, $2,337,500, and in our budget request for fiscal year 1956, we have $1,750,000.

Senator KERR. Requested?

General ITSCHNER. In the request. So, at that rate, sir, at the 1956 rate, it will take us 12 years to accomplish the program if no new studies are authorized.

62536—55——4

Senator KERR. Would you give me information as to how this figure of $1,750,000 was arrived at which is the amount requested for fiscal 1956?

General ITSCHNER. I do not know exactly how that amount was arrived at, sir. We had a request to the budget for a larger amount and it was reduced, so I do not know just how——

Senator KERR. How much did you request of the budget?

General ITSCHNER. $2,100,000.

Senator KERR. Well, how much would you require to enable you to use the manpower you have available or that you could efficiently secure to operate what you think would be the capacity required with reference to these surveys to get them on a current basis?

General ITSCHNER. We had a program of $3 million for this purpose, sir. Now, if you put it on the basis of getting additional people we could increase it beyond that amount, but with the people we now have available for this purpose to do an efficient job at a reasonable rate would require $3 million.

Senator KERR. If you were given $3 million a year then, in your judgment, how long would it take for you to become current in that part of your work?

General ITSCHNER. Well, it would still take us close to 7 years to become current. We always temporize our requests by what we think we can get and that, of course, has occurred in this case.

Senator KERR. Would additional amounts in the appropriation get increased work on the basis that would be about proportionate with $1,750,000 or would the additional appropriation get more work per dollar than you will get out of the $1,750,000?

General ITSCHNER. I believe that the amount would be roughly proportionate, sir.

Senator KERR. Do you have a tabulation of the surveys you have been directed to make and by what authority, and information to enable you to advise this committee, first, as to which ones you are working on now, and second, when the individual surveys would probably be reached on the basis of your $1,750,000 appropriation?

General ITSCHNER. Yes, sir; we do have a program that tabulates all the projects and which ones we are now working on and the amounts required by years for the future years. However, it is on a basis of more than $1,750,000, it is about on the level of the $3 million I spoke of.

We have such a list, sir, and we would be glad to furnish it to you.

Senator KERR. The reason that I asked you that, I am sure that Members of the Congress would be glad to know when the project in which they are interested in is likely to be examined or surveyed.

General ITSCHNER. Yes, sir.

Senator KERR. In the event the work goes on at the bases you have indicated here would be your necessity with the appropriation in the neighborhood of what you have said?

General ITSCHNER. Yes, sir; we can furnish such a list; it is a very lengthy list, as you can well appreciate, but we do have it.

Senator KERR. That is fine; I do not want you to be under any pressure to do it today or tomorrow.

General ITSCHNER. Sir, we have it already prepared, mimeographed. We can furnish you such a list.

(The information requested is as follows:)

DEPARTMENT OF THE ARMY

Schedule of examinations and surveys—General investigations

NAVIGATION STUDIES

Name and location of study	Total estimated cost	Fiscal years						Balance needed to complete
		Amount available			Additional amount required			
		To June 30, 1953	1954	1955	1956	1957	1958	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
NEW ENGLAND DIVISION								
Annisquam River, Mass	$11,500	$700	0	0	0	0	$10,800	0
Apponaug Cove, R. I	2,500	0	0	0	$2,500	0	0	0
Bar Harbor, Maine	12,900	9,200	0	0	3,700	0	0	0
Bass Harbor, Maine	8,500	0	0	0	0	0	2,500	$6,000
Boston Harbor, Mass.:								
Mystic Ship Channel	2,500	1,400	0	0	0	$1,100	0	0
Reserved Channel	7,500	4,000	$3,500	0	0	0	0	0
Brandford Harbor, Conn	3,000	2,200	0	0	0	800	0	0
Bridgeport Harbor, Conn	22,700	6,100	9,700	$6,900	0	0	0	0
Cape Cod Canal, Mass	35,800	21,100	4,700	0	10,000	0	0	0
Carvers Harbor, Maine	2,500	200	0	0	0	2,300	0	0
Chelsea Roads, Mass	12,700	12,700	0	0	0	0	0	0
Connecticut River, Conn.:								
Long Island Sound to Holyoke	82,000	76,500	0	0	0	0	0	5,500
Vicinity Saybrook-Lyme Bridge	10,000	0	0	0	0	0	2,500	7,500
Corea Harbor, Maine	2,500	0	0	0	0	0	0	2,500
Cotuit Harbor, Mass	24,600	16,100	0	0	8,500	0	0	0
Criehaven Harbor, Mass	4,300	3,100	0	0	0	1,200	0	0
Cuttyhunk Harbor, Mass	8,600	6,100	0	0	0	0	2,500	0
Damariscotta Roads, Maine	8,500	0	0	0	0	2,500	6,000	0
Dutch Island Harbor, R. I	2,500	700	0	0	0	0	1,800	0
Eastport Harbor, Maine	8,500	0	0	0	0	2,500	6,000	0
Greenwich Cove, Conn	7,400	4,700	0	0	2,700	0	0	0
Greenwich Cove, R. I	8,500	0	0	0	0	2,500	6,000	0
Hampton River and Harbor, N. H	1,500	400	0	0	1,100	0	0	0
Inland waterway, Massachusetts	57,700	19,900	0	0	0	0	0	37,800
Intracoastal Waterway, R. I	5,900	0	0	0	0	0	0	5,900
Little Harbor, N. H	8,000	0	0	0	0	2,000	6,000	0
Marblehead Harbor, Mass	8,000	0	0	0	0	2,000	6,000	0
Matinicus Harbor, Maine	3,500	2,400	0	0	0	1,100	0	0
Merrimack River, Mass. and N. H	2,500	0	0	0	0	0	0	2,500

Schedule of examinations and surveys—General investigations—Continued

NAVIGATION STUDIES—Continued

Name and location of study	Total estimated cost	Fiscal years						Balance needed to complete
		Amount available			Additional amount required			
		To June 30, 1953	1954	1955	1956	1957	1958	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
NEW ENGLAND DIVISION—Continued								
Nantucket Harbor, Mass	$7,600	0	0	0	0	$1,500	$6,100	0
New Bedford and Fairhaven Harbor, Mass	11,200	$8,900	0	0	$2,300	0	0	0
Newburyport Harbor, Mass	9,500	0	0	0	0	0	0	$9,500
New Haven Harbor, Conn	9,500	0	0	0	0	2,500	7,000	0
Do	2,000	0	0	0	0	2,000	0	0
New London Harbor, Conn. (Bentley's Creek)	3,000	2,300	0	0	0	700	0	0
Newport Harbor, R. I	7,000	4,800	0	0	0	2,200	0	0
Norwalk Harbor, Conn	3,000	0	0	0	0	0	0	3,000
Ogunquit-Perkins Cove, Maine	4,300	2,700	0	0	0	1,600	0	0
Pawtuxet Cove, R. I	9,000	0	0	0	0	2,500	6,500	0
Pepperell Cove, Maine	1,800	0	0	0	1,800	0	0	0
Pine Orchard Harbor, Branford, Conn	2,200	1,400	0	0	0	800	0	0
Plymouth Harbor, Mass	9,000	1,500	0	0	0	7,500	0	0
Point Judith, R. I. (harbor of refuge)	9,000	0	0	0	0	2,500	6,500	0
Providence River and Harbor, R. I	3,400	0	0	0	0	3,400	0	0
Rockland Harbor, Maine	10,000	0	$2,500	$7,500	0	0	0	0
Round Pond Harbor, Maine	8,500	0	0	0	0	0	2,500	6,000
Rye Harbor, N. H	10,000	0	0	0	0	2,500	7,500	0
Salem Harbor, Mass	9,500	4,000	0	5,500	0	0	0	0
Sandy Bay (harbor of refuge), Cape Ann, Mass	2,500	0	0	0	0	0	0	2,500
Saugus River, Mass	2,500	0	0	0	0	0	0	2,500
Seekonk River, R. I	5,100	0	0	0	0	5,100	0	0
Sesuit Harbor, Mass	12,500	0	0	0	0	0	0	12,500
South Bristol Harbor, Maine	10,000	0	0	0	0	0	2,500	7,500
South Harpswell Harbor, Maine	2,000	1,700	0	0	0	300	0	0
Stonington Harbor, Maine	7,200	0	0	0	0	1,200	6,000	0
Winter Harbor, Maine	2,500	0	0	0	0	0	2,500	0
York Harbor, Maine	5,000	200	0	0	0	1,800	3,000	0
Thames River, Conn	7,500	0	0	0	0	7,500	0	0
Milford Harbor, Conn	6,500	0	0	0	0	6,500	0	0
Bridgeport Harbor, Conn., re Johnsons River below Hollisters Dam	8,000	0	0	0	0	2,500	5,500	0

Southwest Harbor, Maine, vicinity of Wells Beach and Drake Island, Maine	2,000	0	0	0	0	0	0	2,000
Eastern River at and in vicinity of Orland, Maine	2,000	0	0	0	0	0	0	2,000
NORTH ATLANTIC DIVISION								
NEW YORK DISTRICT								
Bronx River, N. Y	4,000	1,000	0	0	0	0	3,000	0
Dosoris Creek, N. Y	4,000	0	0	0	0	0	4,000	0
East River and Flushing Bay, N. Y	3,000	500	0	0	0	0	0	2,500
East River and Hell Gate, N. Y	3,000	0	0	0	0	0	0	3,000
Gowanus Canal, Brooklyn, N. Y	4,000	0	0	0	0	4,000	0	0
Hashamomuck Creek, N. Y	5,000	600	0	0	0	0	4,400	0
Hudson River, Endikill Creek, N. Y	100	100	0	(1)	0	0	0	0
Lake Champlain, vicinity Milton and South Hero, Vt	0	0	0	(1)	0	0	0	0
Mamaroneck Harbor, N. Y	12,500	10,800	0	0	0	1,700	0	0
Manhasset Bay, N. Y	5,000	2,800	0	0	0	0	0	2,200
Matawan Creek, N. J	3,500	500	0	0	0	0	0	3,000
Mohawk and Hudson Rivers, N. Y	9,000	9,000	0	(1)	0	0	0	0
Moriches and Shinnecock Inlets, N. Y	39,000	22,600	0	0	16,400	0	0	0
New Creek, Staten Island, N. Y	3,500	0	0	0	0	0	3,500	0
New Jersey Intracoastal Waterway, N. J	67,700	7,700	0	0	0	15,000	20,000	25,000
New York and New Jersey Channels, N. Y	33,900	5,900	0	0	0	16,000	12,000	0
Raritan River, N. J	20,000	13,300	0	0	0	0	6,700	0
Shark River Inlet, N. J	12,000	0	0	0	0	0	12,000	0
Shrewsbury River, N. J	8,000	0	0	0	0	0	8,000	0
St. James Harbor, N. Y	12,800	10,800	0	0	0	0	2,000	0
New York Bay-Delaware River section of Intracoastal Waterway—water supply (revision)	(2)							
New York Harbor South Channel	13,700	12,700	1,000	0	0	0	0	0
PHILADELPHIA DISTRICT								
Delaware River, Pa., N. J., Del.—Philadelphia to the sea—anchorages	9,400	2,400	0	7,000	0	0	0	0
Delaware River, Pa., N. J., and Del.—Philadelphia to the sea—channel dimensions	47,000	0	0	0	20,000	27,000	0	0
Delaware River, Pa., N. J., and Del.—Philadelphia to the sea—oil pollution	27,000	24,900	0	0	0	0	0	2,100
Delaware River in vicinity of Camden, N. J	4,000	500	0	0	3,500	0	0	0
Great Egg Harbor Inlet, N. J	7,900	900	4,000	0	0	3,000	0	0
New Jersey Intracoastal Waterway Shrewsbury River-Delaware Bay	25,000	0	0	0	0	10,000	15,000	0
Wilmington Harbor, Del	4,500	0	0	0	0	0	4,500	0
Delaware River at Delaware	14,000	0	0	0	0	0	15,000	0

[1] Reports to be completed with NENYIAC funds.
[2] Not available.

Schedule of examinations and surveys—General investigations—Continued

NAVIGATION STUDIES—Continued

Name and location of study	Total estimated cost	Fiscal years						Balance needed to complete
		Amount available			Additional amount required			
		To June 30, 1953	1954	1955	1956	1957	1958	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
NORTH ATLANTIC DIVISION—Continued								
BALTIMORE DISTRICT								
Apes Hole Creek, Somerset County, Md	$2,000	0	0	0	0	0	$2,000	0
Assateague Channel and Smallers Drain, Accomack County, Va	5,500	$2,500	0	0	0	$3,000	0	0
Back River, Baltimore County, Md	2,000	0	0	0	0	2,000	0	0
Baltimore Harbor and channels, Maryland	35,000	8,600	$4,900	$21,500	0	0	0	0
Betterton Harbor, Kent County, Md. (revised)	1,000	200	800	0	0	0	0	0
Chincoteague Bay with a view to establishing a harbor of refuge at Chincoteague, Accomack County, Va	8,000	0	0	0	0	0	8,000	0
Goose Creek, Manokin River, Somerset County, Md	7,200	1,200	0	0	0	6,000	0	0
Guilford Creek, Accomack County, Va	7,000	0	0	0	0	7,000	0	0
Havre de Grace, Md., channel for yacht basin to Oakington Channel	1,200	0	0	0	0	0	1,200	0
Havre de Grace, Md., main channel from Turkey Point to Havre de Grace	10,000	0	0	0	0	0	10,000	0
Holdens Creek, Accomack County, Va	1,000	200	800	0	0	0	0	0
Powells Bay, Accomack County at Wisherts Point and channel connecting said bay with "The Ballast"	8,000	2,000	0	0	0	0	6,000	0
Severn River with particular reference to Ringgold Cove, Anne Arundel County, Md	2,000	0	0	0	0	2,000	0	0
St. Michaels, Talbot County, Md	2,000	0	0	0	0	2,000	0	0
St. Peters Creek, Manokin River, Somerset County, Md	7,700	1,700	0	0	0	0	6,000	0
Tolchester Beach area, Kent County, Md	700	0	400	0	0	0	300	0
Wicomico River, Md	10,000	1,100	0	0	0	0	8,900	0
WASHINGTON DISTRICT								
Bonum Creek, Va	5,900	5,900	0	0	0	0	0	0
Hull Creek, Va	7,300	7,300	0	0	0	0	0	0
Jules Creek, Va	1,700	0	0	0	0	0	1,700	0
McKans Bay, Va	2,300	0	0	0	0	0	2,300	0
Monroe Bay and Creek, Va	6,800	6,800	0	0	0	0	0	0

Pecks Creek, Va	2,000	0	0	0	0	0	2,000	0
Point Lookout Creek, Va	5,500	0	0	0	0	0	5,500	0
Popes Creek, Va	7,600	0	0	0	0	0	7,600	0
Potomac and Anacostia Rivers and adjacent waters in and near District of Columbia	150,000	9,500	0	0	0	0	5,000	$135,500
Hacks Creek (revision)	(3)							
NORFOLK DISTRICT								
Aberdeen Creek, Va	8,700	6,700	0	0	0	2,000	0	0
Appomattox River, Va	5,500	2,900	0	0	0	0	2,600	0
Back River, Va	6,600	1,800	0	0	0	0	4,800	0
Bennetts Creek, Va	11,200	1,800	0	0	0	0	0	9,400
Browns Bay, Va	2,500	0	0	0	0	0	2,500	0
Chuckatuck Creek, Va	8,700	7,700	0	0	0	1,000	0	0
Eastern Branch, Elizabeth River, Va	7,700	200	0	0	0	0	0	7,500
Finneys Creek, Va	8,900	2,400	0	0	0	6,500	0	0
Hampton Creek, Va	3,400	2,100	0	0	0	0	1,300	0
James River, Va	165,600	8,600	0	0	$16,000	40,000	70,000	31,000
Jones Creek, Va	3,000	0	0	0	0	0	3,000	0
Little Creek, Va	7,500	2,700	0	0	0	0	4,800	0
Lynnhaven Inlet and Bay, Va	187,400	182,400	0	5,000	0	0	0	0
Nansemond River, Va	3,000	0	0	0	0	0	0	3,000
Pasquotank River, N. C	20,000	20,000	0	0	0	0	0	0
Princess Anne County, Va	39,100	35,100	0	0	4,000	0	0	0
Queens Creek, Va	3,000	0	0	0	0	0	0	3,000
Salters Creek, Va	3,000	1,200	0	0	0	0	1,800	0
Southern Branch, Elizabeth River, Va	5,000	0	0	0	0	5,000	0	0
South Norfolk Basin, Va	1,900	200	0	0	0	0	0	1,700
Willoughby Channel, Va	2,300	0	0	0	0	0	0	2,300
SOUTH ATLANTIC DIVISION								
WILMINGTON DISTRICT								
Bogue Inlet and Swansboro Harbor, N. C	3,000	0	0	0	0	0	3,000	0
Carolina Beach, N. C	10,400	5,400	0	0	0	5,000	0	0
Cape Channel, Pamlico Sound, N. C	4,000	0	0	0	0	0	4,000	0
Harkers Point Basin at Harkers Island, Carteret County, N. C	2,500	100	0	0	0	0	2,400	0
Holden Beach, Brunswick County, N. C	3,600	3,600	0	0	0	0	0	0
Intracoastal Waterway, investigation of lands between Albemarle Sound and Pungo River	25,000	15,800	0	0	0	9,200	0	0
Middle Creek, N. C	3,000	0	0	0	0	0	3,000	0
Morehead City Harbor	11,500	10,000	1,500	0	0	0	0	0
Pamlico Sound to Beaufort Harbor in vicinity of Sealevel, N. C	4,000	0	0	0	0	0	4,000	0
Shallotte River, N. C	3,000	0	0	0	0	3,000	0	0
Thoroughfare to Albemarle Sound (lower Cashie River and connecting channels), N. C	6,600	1,600	0	0	0	0	5,000	0
Topsail Inlet, N. C	2,500	0	0	0	0	0	2,500	0

[3] Not available.

Schedule of examinations and surveys—General investigations—Continued

NAVIGATION STUDIES—Continued

Name and location of study	Total estimated cost	Fiscal years						Balance needed to complete
		Amount available			Additional amount required			
		To June 30, 1953	1954	1955	1956	1957	1958	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
SOUTH ATLANTIC DIVISION—Continued								
CHARLESTON DISTRICT								
Boat Basin, Beaufort, S. C	$5,000	0	0	0	0	0	0	$5,000
Charleston Harbor, Drum Island Channel	4,800	$2,800	$2,000	0	0	0	0	0
Cooper River, S. C	10,400	5,400	0	0	$5,000	0	0	0
Harbor for light-draft vessels, Myrtle Beach, S. C	20,100	5,100	0	0	0	$15,000	0	0
Little River Inlet, N. C. and S. C	23,100	3,100	0	0	0	0	0	20,000
Santee River system, North Carolina and South Carolina	64,800	35,200	0	0	0	0	$20,000	9,600
Shem Creek, S. C	2,200	200	0	0	0	2,000	0	0
JACKSONVILLE DISTRICT								
Aguadilla Harbor, P. R	3,500	0	0	0	0	0	0	3,500
Arecibo Harbor, P. R	11,100	900	0	0	0	0	0	10,200
Bakers Haulover Inlet, Fla	21,500	10,100	0	0	0	0	0	11,400
Boot Key Harbor, Fla	16,500	1,000	0	0	0	0	5,700	9,800
Booth Point, Fla	5,200	0	0	0	0	0	0	5,200
Canaveral Harbor, Fla	11,100	4,600	0	0	0	0	6,500	0
Everglades, Channel and Harbor, Fla	21,500	18,700	0	0	0	2,800	0	0
Fajardo Harbor, P. R	30,300	9,200	0	0	0	0	0	21,100
Fort Pierce Harbor, Fla	7,600	3,200	0	0	0	0	0	4,400
Gulf Coast Shrimp Boats Harbor, Fla	36,000	7,200	0	$5,000	7,500	10,000	6,300	0
Humacao Playa, P. R	33,700	28,400	0	0	0	0	0	5,300
Intracoastal Waterway, Jacksonville to Miami—south channels (revision)	[2]							
Intracoastal Waterway, St. Marks River to Tampa Bay, Fla	100,900	93,900	0	0	0	0	7,000	0
Jupiter Inlet, Fla	13,700	11,000	0	0	0	0	0	2,700
Key West Harbor, Fla	8,800	0	0	0	0	0	0	8,800
Lake Tarpon, Fla. (salt water intrusion)	[3]							
Little Pass, Fla	28,000	18,600	0	0	0	0	0	9,400
Miami Harbor, Fla	10,200	2,200	0	0	0	0	8,000	0
Palm Beach Harbor, Fla	12,000	0	6,600	0	0	5,400	0	0
Port Everglades (Hollywood Harbor), Fla	22,300	0	0	0	10,000	12,300	0	0

St. Petersburg Harbor, Fla	6,800	300	0	0	0	0	0	6,500
Sanford-Titusville Canal, Fla	27,000	21,400	0	0	0	5,600	0	0
San Juan, P. R	23,700	9,700	6,000	8,000	0	0	0	0
Sarasota, Fla. (channels and passes)	11,200	0	0	0	0	0	0	11,200
Santa Fe River, Fla	7,200	2,200	0	0	0	0	0	5,000
MOBILE DISTRICT								
Apalachicola River system 308 report	313,400	149,800	1,800	200	0	12,000	50,000	99,600
Bayou Bernard, Miss	7,000	0	0	0	0	0	7,000	0
Bon Secour to Gulf Waterway, Ala	9,500	8,300	1,000	200	0	0	0	0
Cadet Bayou, Miss	4,000	0	0	0	0	0	0	4,000
Choctawhatchee Bay, Fla. (Basin Bayou and Bay Bridge)	2,000	400	0	0	0	0	0	1,600
East Pass, Fla., from gulf to Choctawhatchee Bay	9,500	0	0	0	0	9,500	0	0
Escambia River, Fla	25,000	0	0	0	0	6,500	0	18,500
Escambia River, Fla. and Ala., waterway, Columbus to Pensacola	5,000	0	0		0	0	0	5,000
Escambia River to Alabama River, connecting waterway	3,000	1,700	0	0	0	0	0	1,300
Flint River, Ga	8,000	6,500	0	0	0	0	0	1,500
Gulfport Harbor, Miss	4,900	4,200	0	700	0	0	0	0
Heron Bay, Ala	7,500	2,500	0	0	0	5,000	0	0
Mobile, Ala., Pascagoula, Gulfport, and Biloxi, Miss.—40-foot channels	6,000	0	0	0	0	0	0	6,000
Mobile Bay, Ala., small craft (Dog and Fowl Rivers)	11,200	4,200	0	0	0	0	7,000	0
Mobile Harbor, Ala., fresh-water harbor project	10,000	0	0	0	0	0	0	10,000
Pascagoula Harbor, Miss	5,000	0	0	5,000	0	0	0	0
Pearl River, Miss. (1939 review)	2,000	200	0	0	0	0	0	1,800
Pearl River, Miss. (1952 review)	6,000	0	0	0	0	6,000	0	0
Pensacola Bay, Fla. (Bayou Texar and Bayliss Park)	3,000	500	0	0	0	0	0	2,500
Pensacola Harbor, Fla., (ship channel)	14,000	2,800	0	0	0	0	0	11,200
Perdido Bay, Ala	22,700	21,500	1,200	0	0	0	0	0
Philips Inlet, Fla	3,000	700	0	0	0	0	0	2,300
St. Marks to Tallahassee, Fla., canal	2,000	1,400	0	0	0	0	0	600
Santa Rosa Island, Fla., waterway to gulf	1,500	500	0	0	0	0	1,000	0
Sioux Bayou, Miss	1,500	0	0	0	0	0	0	1,500
Warrior-Tombigbee Rivers, Ala	24,000	5,900	0	0	0	0	0	18,100
Mobile River, salinity line	[2]							
LOWER MISSISSIPPI VALLEY DIVISION								
NEW ORLEANS DISTRICT								
Gulf Intracoastal Waterway La.-Tex	30,000	10,000	10,000	10,000	0	0	0	0
Streams and bayous in southwest Louisiana west of the west Atchafalaya Basin protection levee	109,000	35,200	2,000	5,000	25,000	25,000	16,800	0
Tangipahoa River and tributaries, Louisiana	6,100	1,200	0	0	0	4,900	0	0
Lake Pontchartrain, La	30,000	0	0	0	0	0	30,000	0
Lake Pontchartrain, La., seaplane base and shore protection	6,600	0	0	0	0	0	0	6,600
Mississippi River at Baton Rogue, La	18,000	0	0	0	0	0	0	18,000
Chefuncte and Bogue Falia Rivers, La	10,000	0	0	0	0	0	10,000	0
Bayous Petit Anse, Tigre and Carlin, La	5,000	0	0	0	0	5,000	0	0
Bayou Lafourche and Lafourche-Jump Waterway	15,500	4,000	11,500	0	0	0	0	0
Barataria Bay Waterway	18,000	13,000	0	5,000	0	0	0	0
Atchafalaya River, Morgan City to gulf	21,000	7,800	0	0	0	0	0	13,200
Bayous Terrebonne, Petit Caillou, and du Large	21,100	0	0	0	0	0	21,100	0

[2] Not available.

Schedule of examinations and surveys—General investigations—Continued

NAVIGATION STUDIES—Continued

Name and location of study	Total estimated cost	Fiscal years						Balance needed to complete
		Amount available			Additional amount required			
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(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
LOWER MISSISSIPPI VALLEY DIVISION—Continued								
VICKSBURG DISTRICT								
None								
MEMPHIS DISTRICT								
Mississippi River at West Memphis, Ark	$18,000	$4,400	0	0	0	0	0	$13,600
Wolf River, Tenn	5,000	0	0	0	0	0	0	5,000
ST. LOUIS DISTRICT								
Mississippi River between mouth of Missouri River and Minneapolis, Minn., comprehensive harbor report	50,500	35,900	0	0	0	0	0	14,600
Mississippi River Golden Eagle and West Point ferry landings	5,500	0	0	0	0	0	0	5,500
Mississippi River, 12-foot channel	236,000	225,700	$1,100	0	0	$9,200	0	0
Kaskaskia River, Ill	(2)							
SOUTHWESTERN DIVISION								
GALVESTON DISTRICT								
Alvin to Gulf Intracoastal Waterway, Tex	4,000	0	0	0	0	0	0	4,000
Colorado River, Tex. (outlet to gulf) and channel from Port Lavaca and Palacios to gulf, Texas	16,900	10,000	1,000	$5,900	0	0	0	0
Dickinson Bayou, Tex	3,000	0	0	0	0	0	0	3,000
Double Bayou, Tex	2,000	300	0	0	0	0	0	1,700
Freeport Harbor, Tex	6,000	0	300	5,700	0	0	0	0
Galveston Bay (seaplane base)	3,000	0	0	0	0	0	0	3,000
Galveston Harbor and channel and Houston ship channel, Tex	26,000	3,800	0	0	0	22,200	0	0
Guadalupe and San Antonio Rivers, Tex	245,000	0	0	0	0	0	$20,000	225,000
Gulf Intracoastal Waterway (main channel), Texas–Iowa	53,100	9,800	19,300	24,000	0	0	0	0
Gulf Intracoastal Waterway-Brazos and Colorado River Crossings, Tex	89,200	86,100	0	0	0	0	3,100	0
Gulf Intracoastal Waterway-channel to Harlingen, Tex	7,500	0	0	0	0	7,500	0	0

Gulf Intracoastal Waterway-Port Mansfield, Tex	9,500	0	0	0	$3,800	5,700	0	0
Gulf Intracoastal Waterway-channel to Palacios, Tex	3,700	1,700	0	0	0	0	0	2,000
Gulf Intracoastal Waterway-channel to Riviera and Kingsville, Tex	20,000	400	0	0	0	0	0	19,600
Gulf Intracoastal Waterway-San Bernard River, Tex	13,000	11,000	0	0	2,000	0	0	0
Lavaca and Navidad Rivers, Tex	7,000	0	0	0	0	0	7,000	0
Pass Cavallo to Port Lavaca, Tex	1,800	0	1,800	0	0	0	0	0
Pine Island Bayou and channel Neches River to Trinity River, Tex	3,800	800	0	0	0	0	0	3,000
Port Aransas-Corups Christi Waterway, Tex	28,700	6,100	17,000	0	5,600	0	0	0
Trinity River, channel to Liberty Tex	16,400	12,400	4,000	0	0	0	0	0
FORT WORTH DISTRICT								
Colorado River and tributaries, Texas	330,500	275,500	0	0	0	0	0	55,000
Neches River and tributaries Texas	60,000	20,200	0	0	0	0	0	39,800
Sabine River and tributaries, Texas	60,000	18,600	0	0	0	20,000	21,400	0
Trinity River and tributaries, Texas	778,300	517,300	0	0	0	0	0	261,000
ALBUQUERQUE DISTRICT								
None								
LITTLE ROCK DISTRICT								
None								
TULSA DISTRICT								
None								
MISSOURI RIVER DIVISION								
None								
OHIO RIVER DIVISION								
NASHVILLE DISTRICT								
None								
LOUISVILLE DISTRICT								
Mouth of Licking River, Ky. (interim report)	2,500	0	0	2,500	0	0	0	0
Mouth of Licking River, Ky	2,500	0	0	0	0	0	0	2,500
Ohio River at Brookport, Ill	2,500	1,200	0	0	0	0	0	1,300
Ohio River, 12-foot channel, survey (including Allegheny, Monongahela, and Kanawha Rivers	380,200	296,000	0	0	0	30,400	23,800	30,000
HUNTINGTON DISTRICT								
Gallipolis, Ohio	4,600	1,400	0	3,200	0	0	0	0
Muskingum River, Ohio	13,400	12,800	0	0	0	0	0	600
Ohio River, 12-foot channel, survey (including Allegheny, Monongahela, and Kanawha Rivers)	272,300	255,000	0	0	0	17,300	0	0

[3] Not available.

Schedule of examinations and surveys—General investigations—Continued

NAVIGATION STUDIES—Continued

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		Amount available			Additional amount required			
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(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
OHIO RIVER DIVISION—Continued								
PITTSBURGH DISTRICT								
Lake Erie and Ohio River Canal—Pittsburgh-Ashtabula route	$135,800	$113,600	0	0	0	0	0	$22,200
Ohio River, 12-foot channel survey (including Allegheny, Monongahela, and Kanawha Rivers)	88,500	79,600	0	0	0	$2,700	$4,100	2,100
NORTH CENTRAL DIVISION								
ROCK ISLAND DISTRICT								
Mississippi River, Missouri River to Minneapolis, Minn., Beaver Slough at Clinton, Iowa	5,000	0	$5,000	0	0	0	0	0
Comprehensive Harbor report	42,000	37,200	0	0	0	0	4,800	0
Mississippi River at Clinton, Iowa	3,000	0	0	$3,000	0	0	0	0
Mississippi River, 12-foot channel	192,000	182,500	0	0	0	9,500	0	0
ST. PAUL DISTRICT								
Lake Minnetonka, Minn., channels	5,000	0	0	0	0	0	0	5,000
Mississippi River above Coon Rapids Dam—Headwaters reservoir study	74,000	16,700	0	0	0	27,300	30,000	0
Knutson Dam (interim report)	25,000	21,000	0	4,000	0	0	0	0
Mississippi River at Winona—reconstruction of levee wall	3,500	0	0	0	0	0	3,500	0
Mississippi River, Missouri River to Minneapolis—comprehensive harbor	50,000	48,000	0	0	0	0	2,000	0
Springsteel Island Harbor, Lake of the Woods, Minn	2,000	0	0	0	0	0	0	2,000
12-foot waterway on Mississippi, St. Croix, and Black Rivers	195,000	191,100	0	0	0	3,900	0	0
Upper Mississippi River—St. Anthony Falls, apron study and economic study	7,500	0	0	7,500	0	0	0	0
Wisconsin River, Wis	4,800	100	0	0	0	0	0	4,700

DULUTH DISTRICT								
Duluth-Superior Harbor, Minn. and Wis	125,700	10,700	500	4,000	$25,000	45,000	40,500	0
Saxon Harbor, Wis	7,600	5,900	0	1,700	0	0	0	0
Au Train or Shelter Bay, Mich	2,500	1,400	0	0	0	1,100	0	0
Munising Harbor, Mich	3,500	0	0	0	0	0	0	3,500
Lake Superior shoreline, Marquette, Mich	3,500	700	0	0	0	0	0	2,800
Herbster Harbor, Wis	10,500	3,900	5,100	0	0	1,500	0	0
Little Girls Point, Mich	4,300	3,300	0	0	0	1,000	0	0
Cornucopia Harbor, Wis	6,500	5,000	1,500	0	0	0	0	0
MILWAUKEE DISTRICT								
Milwaukee Harbor, Wis	7,000	3,500	0	0	0	3,500	0	0
Two Rivers Harbor, Wis	6,600	2,600	4,000	0	0	0	0	0
Grand Haven Harbor, Mich	6,000	3,000	1,600	0	1,400	0	0	0
Sturgeon Bay and Lake, Michigan Ship Canal, Wis	2,200	1,400	0	0	800	0	0	0
Fox River, Wis	8,100	7,100	0	1,000	0	0	0	0
Coast of Door County, Wis	9,500	1,500	0	0	0	8,000	0	0
St. Joseph Harbor, Mich	1,200	0	400	800	0	0	0	0
Ludington Harbor, Mich	2,400	1,400	0	0	0	0	0	1,000
Mona Lake (Lake Harbor) channel, Mich	3,400	2,400	0	0	0	0	0	1,000
CHICAGO DISTRICT								
Illinois Waterway, Ill. and Ind., 12-foot channel	65,500	55,500	0	0	0	10,000	0	0
Burns Waterway, Ind	37,000	7,000	0	4,000	15,000	11,000	0	0
Illinois River at Beardstown	3,000	0	0	0	0	3,000	0	0
Michigan City Harbor	5,000	0	0	0	0	5,000	0	0
Illinois Waterway, Ill. and Ind., interim study, duplicate locks	37,000	34,100	1,900	0	1,000	0	0	0
DETROIT DISTRICT								
St. Marys River, Mich	9,500	2,900	0	0	0	6,600	0	0
South Shore of Lake Huron, Mich	122,500	38,400	0	0	0	10,000	35,500	38,600
Mackinaw City, Mich	6,800	6,300	0	0	500	0	0	0
Alpena Harbor, Mich	2,000	0	0	0	0	0	2,000	0
Rouge River, Mich	28,800	3,800	0	9,000	6,000	10,000	0	0
Coasts of Lake Erie	43,100	10,400	0	0	0	0	0	32,700
Waterway, Lake Erie to Lake Michigan	5,600	3,100	0	0	0	0	2,500	0
Great Lakes, connecting waters	125,200	0	100,400	24,800	0	0	0	0
Toledo Harbor, Ohio	12,100	3,100	2,000	7,000	0	0	0	0
BUFFALO DISTRICT								
Ashtabula Harbor, Ohio	15,000	0	14,000	1,000	0	0	0	0
Big Sandy Creek and Mexico Bay, N. Y	5,900	1,000	0	0	0	0	0	4,900
Chaumont River, Henderson and Chaumont Bays, N. Y	21,300	5,900	0	0	0	0	0	15,400
Dunkirk Harbor, N. Y	12,600	100	0	0	0	12,500	0	0
Hamlin Beach State Park, N. Y	12,300	6,500	0	0	0	5,800	0	0
Irondequoit Bay, N. Y	24,200	21,900	2,300	0	0	0	0	0
Ogdensburg Harbor, N. Y	5,800	500	0	0	0	5,300	0	0

Schedule of examinations and surveys—General investigations—Continued

NAVIGATION STUDIES—Continued

Name and location of study	Total estimated cost	Fiscal years						Balance needed to complete
		Amount available			Additional amount required			
		To June 30, 1953	1954	1955	1956	1957	1958	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
NORTH CENTRAL DIVISION—Continued								
BUFFALO DISTRICT—continued								
Sackets Harbor, N. Y.	$42,000	$3,800	0	0	0	0	$20,000	$18,200
Sandy Pond, N. Y.	6,200	0	0	0	0	0	0	6,200
Cleveland Harbor, Ohio (interim)	22,400	14,000	$4,400	$4,000	0	0	0	0
Cleveland Harbor, Ohio (final)	14,500	10,300	0	0	$4,200	0	0	0
Conneaut Harbor, Ohio	43,900	7,600	0	0	6,500	$19,800	10,000	0
Vermilion Harbor, Ohio	16,500	11,400	0	0	1,100	4,000	0	0
Lorain Harbor, Ohio	[3]							
Shores of Lake Erie for harbors and harbors of refuge for light-draft vessels	206,300	89,400	0	0	0	0	20,000	96,900
Niagara power development [4]	11,000	0	0	11,000	0	0	0	0
SOUTH PACIFIC DIVISION								
LOS ANGELES DISTRICT								
Avila (Port San Luis)	15,000	200	0	0	0	14,800	0	0
Cambria and San Simeon Bay	33,000	0	0	0	0	10,000	23,000	0
Camp Pendleton Harbor and Agua Hedionda Lagoon Harbor, Calif.	47,000	17,000	0	5,000	13,000	12,000	0	0
Coast of southern California, small craft	15,000	5,000	0	0	0	10,000	0	0
Coxe Anchorage	18,000	0	0	0	0	0	0	18,000
Dana Point	20,000	0	0	0	0	0	0	20,000
Lompoc Landing	32,000	0	0	0	0	0	22,000	10,000
Los Angeles-Long Beach breakwater extension	25,000	12,000	0	0	7,000	6,000	0	0
Malibu Creek	25,500	0	0	0	0	0	15,000	10,500
National City, Chula Vista and Roseville, Calif.	20,500	0	0	0	0	0	0	20,500
Newport Bay (upper), Calif.	6,000	0	0	0	0	6,000	0	0
San Diego Harbor including Glorietta Bay	28,000	2,600	0	0	0	0	0	25,400
Santa Barbara Harbor	39,500	3,000	0	0	0	20,000	16,500	0
Santa Monica Harbor	5,000	0	0	0	0	0	0	5,000

SAN FRANCISCO DISTRICT								
Harbors for light-draft vessels, coast of Hawaiian Islands	80,000	18,700	0	0	0	10,000	31,300	20,000
Northern California coast	279,800	57,200	0	0	0	10,000	30,000	182,600
Russian River, Calif	34,500	300	0	0	0	0	0	34,200
Santa Cruz, Calif	46,400	14,000	0	0	3,100	16,400	12,900	0
Tomales Bay, Calif	34,200	10,300	0	0	0	0	0	23,900
Hilo Harbor, Hawaii, T. H. (lava barrier)	5,000	0	0	0	0	0	0	5,000
Hilo Harbor, Hawaii, T. H. (seawall)	23,000	20,800	0	0	2,200	0	0	0
Honolulu Harbor anchorage areas, Oahu, T. H	8,900	7,100	0	1,800	0	0	0	0
Kahului Harbor, Maui, T. H. (revision)	7,000	0	0	0	0	7,000	0	0
Kalaupapa Landing, Molokai, T. H	8,900	2,000	200	5,800	0	0	0	0
Kalepoleop Harbor, Maui, T. H	12,000	10,000	0	0	2,000	0	0	0
Kewalo Basin and Ali Wai yacht basin, Oahu, T. H	24,200	4,800	0	400	0	13,000	6,000	0
Lahaina Harbor, Maui, T. H	7,000	0	0	0	0	7,000	0	0
Monterey Bay, Calif	106,400	88,500	1,500	0	8,000	8,400	0	0
Moss Landing Harbor, Calif	20,300	0	0	0	0	0	20,300	0
Noyo Harbor, Calif	21,000	0	0	10,000	11,000	0	0	0
Oakland Harbor (Fruitvale Avenue Bridge)	18,300	16,100	0	0	2,200	0	0	0
SACRAMENTO DISTRICT								
Sacramento, Calif., harbor	25,000	0	0	0	0	0	0	25,000
Sacramento River and tributaries, California (debris control, Bear River)	50,000	5,800	0	0	0	0	0	44,200
Sacramento-San Joaquin Delta, Calif	19,800	19,800	0	0	0	0	0	0
NORTH PACIFIC DIVISION								
PORTLAND DISTRICT								
Birnie Creek, Wash	2,300	0	0	0	0	0	0	2,300
Chetco Cove	2,500	0	2,500	0	0	0	0	0
Columbia River at Bonneville, Oreg. and Wash	4,000	100	0	0	0	0	3,900	0
Columbia River, Celilo to McNary Dam, Oreg. and Wash	10,000	1,100	0	0	0	0	8,900	0
Nehalem Bay, Oreg	10,500	0	0	0	0	10,500	0	0
Port Orford, Oreg	4,100	1,300	0	0	0	0	2,800	0
Rogue River, Weddeburn to Agness, Oreg	4,500	0	0	0	0	0	0	4,500
Siletz River and Drift Creek, Oreg	9,600	6,600	0	0	0	0	0	3,000
Siuslaw River and Bar, Oreg	11,300	4,800	4,500	2,000	0	0	0	0
Tillamook Bay, Oreg	15,600	13,000	2,600	0	0	0	0	0
Vancouver Lake, Wash	2,500	0	0	0	0	0	0	2,500
Winchester Bay, Oreg	5,000	0	0	5,000	0	0	0	0
Yaquina Bay and Harbor, Oreg	10,400	5,900	1,100	3,400	0	0	0	0
Oregon Slough, Oreg	4,800	3,800	0	0	1,000	0	0	0

[2] Not available.
[3] Exclusive of $395,700 expended from other funds.

Schedule of examinations and surveys—General investigations—Continued

NAVIGATION STUDIES—Continued

Name and location of study	Total estimated cost	Fiscal years						Balance needed to complete
		Amount available			Additional amount required			
		To June 30, 1953	1954	1955	1956	1957	1958	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
NORTH PACIFIC DIVISION—Continued								
SEATTLE DISTRICT								
Bellingham Harbor, Wash	$10,000	0	0	$2,700	$7,300	0	0	0
Des Moines Harbor, Wash	2,300	0	0	0	0	0	$2,300	0
Douglas-Juneau Harbors, Alaska	12,800	$12,300	$500	0	0	0	0	0
Eagle Harbor, Wash	10,400	2,400	0	0	0	0	8,000	0
Fisherman Bay, Wash	4,100	3,800	0	300	0	0	0	0
Friday Harbor, Wash	2,500	0	0	0	2,500	0	0	0
Grays Harbor, and Chehalis River, Wash	2,800	0	0	0	2,800	0	0	0
Indian Bay, Wash	2,500	0	0	0	0	0	2,500	0
Lake Washington ship canal, Washington	38,800	36,300	2,500	0	0	0	0	0
Miller Bay, Wash	2,300	0	0	0	0	0	2,300	0
Port Townsend, Wash	6,800	200	1,600	5,000	0	0	0	0
Priest Rapids lock, Washington	5,000	0	0	0	5,000	0	0	0
Quilcene Bay, Wash	9,800	3,300	0	0	0	0	6,500	0
Seabeck Harbor, Wash	2,200	100	0	0	0	0	2,100	0
Skagit River, Wash	20,000	500	0	0	0	0	0	$19,500
Tacoma (Small-Board) Harbor, Wash	12,500	1,200	0	0	5,000	$6,300	0	0
Tacoma (Wapato Waterway), Wash	4,200	0	4,200	0	0	0	0	0
Willapa River, Wash	8,600	8,000	600	0	0	0	0	0
WALLA WALLA DISTRICT								
None								
ALASKA DISTRICT								
Alaska 308 report	325,000	195,100	30,000	17,000	15,000	30,000	37,900	0
Transfer to NENYIAC	14,700	0	14,700	0	0	0	0	0
Total, navigation studies	9,810,300	4,780,000	330,000	275,000	300,000	886,200	1,096,800	2,142,300

NEW ENGLAND DIVISION								
All streams in New England	(2)	0	0	(4)	0	0	0	0
Aroostock River, Maine	$11,900	$11,900	0	0	0	0	0	0
Ash and Pine Creeks, Fairfield and vicinity, Connecticut	(2)	0	0	(4)	0	0	0	0
Connecticut River, Vt., N. H., Mass., and Conn	260,400	260,400	0	(4)	0	0	0	0
Ammonoosuc River, N. H	(2)							
Israel River, N. H	(2)							
Passumpsic River, Vt	7,900	7,900	0	0	0	0	0	0
Housatonic River, Mass. and Conn	57,600	57,600	0	(4)	0	0	0	0
Ipswich, River, Mass	(2)	0	0	0	0	0	0	0
Kennebec River, Maine	(2)	0	0	(4)	0	0	0	0
Merrimack River, N. H. and Mass	159,700	159,700	0	(4)	0	0	0	0
Mystic River, Mass	(2)	0	0	(4)	0	0	0	0
Neponset River, Mass	(2)	0	0	0	0	0	0	0
Thames River, Conn	(2)	0	0	(4)	0	0	0	0
NORTH ATLANTIC DIVISION								
NEW YORK DISTRICT								
Big Chazy River, N. Y	600	600	0	(4)	0	0	0	0
Esopus Creek, N. Y	0	0	0	(4)	0	0	0	0
Hackensack River, N. J. and N. Y	32,500	8,500	0	0	0	0	$24,000	0
Hudson River, Rensselaer County, N. Y	2,200	2,200	0	(4)	0	0	0	0
Mohawk River, N. Y	26,300	26,300	0	(4)	0	0	0	0
Passaic River, N. J	229,000	158,700	0	0	$15,000	$20,000	35,300	0
Rahway River, N. J	38,000	6,400	0	0	0	31,600	0	0
Winooski River, Vt	19,800	19,800	0	(4)	0	0	0	0
PHILADELPHIA DISTRICT								
Delaware River, Pa., N. J., and Del., review of 308 report	21,500	18,700	0	$2,800	0	0	0	0
Delaware River in vicinity of Yardley, Pa	4,000	0	$700	3,300	0	0	0	0
Delaware River in vicinity of Castle and Delaware City, Del	3,000	0	0	0	0	0	0	$3,000
Delaware River in vicinity of Smithville and along Rancocas Creek, N. J	3,000	0	0	0	0	0	0	3,000
BALTIMORE DISTRICT								
Juniata River, Pa	166,000	125,200	0	5,000	22,000	13,800	0	0
Marshy Hope Creek, Md	22,000	9,600	0	0	0	0	12,400	0
Nanticoke River and tributaries, Maryland and Delaware	9,500	0	0	0	0	4,000	5,500	0
West Branch Susquehanna River, Pa	267,300	221,900	5,400	2,000	0	20,000	18,000	0
North Branch Susquehanna River, Pa	281,800	277,200	4,600	0	0	0	0	0

[2] Not available.
[4] Reports to be completed with NENYIAC funds.

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Schedule of examinations and surveys—General investigations—Continued

FLOOD CONTROL STUDIES—Continued

Name and location of study	Total estimated cost	Fiscal years						Balance needed to complete
		Amount available			Additional amount required			
		To June 30, 1953	1954	1955	1956	1957	1958	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
NORTH ATLANTIC DIVISION—Continued								
WASHINGTON DISTRICT								
Gilbert Run, Md	$2,000	0	0	0	0	0	$2,000	0
Port Tobacco Run, Md	2,000	0	0	0	0	0	2,000	0
Potomac River and tributaries, Hyndam Borough and vicinity, Wills and Little Wills Creek, Pa	7,800	0	0	0	0	0	7,800	0
Potomac River and tributaries, Maryland, Virginia, West Virginia, and Pennsylvania	32,000	$2,800	0	0	0	0	15,000	$14,200
Potomac River and tributaries, Williamsport, Md	10,000	900	0	0	0	$9,100	0	0
Potomac River and tributaries, Maryland, Virginia, West Virginia, and Pennsylvania, modification of Savage River Dam and Reservoir to provide water supply to Westernport, Md	6,600	0	0	0	0	6,600	0	0
Anacostia River and Flats, Washington, D. C. (reclamation)	25,000	0	0	0	$10,000	15,000	0	0
NORFOLK DISTRICT								
Chowan River Basin, Va. and N. C	12,000	1,800	0	0	0	0	10,200	0
Lynchburg, Va	29,000	16,900	0	0	0	5,000	7,100	0
Mattaponi River, Va	8,000	0	0	0	0	0	8,000	0
South Boston, Va	12,500	11,000	0	0	0	1,500	0	0
SOUTH ATLANTIC DIVISION								
WILMINGTON DISTRICT								
Cape Fear River, N. C	95,000	73,600	0	0	0	10,000	11,400	0
Core Creek, Neuse River, N. C	11,000	9,100	0	0	0	0	1,900	0
Filberts Creek, N. C	2,000	0	0	0	0	0	2,000	0
Neuse River between Smithfield and Wayne County line	9,000	6,900	0	0	0	0	2,100	0
Neuse River, N. C	5,500	0	0	0	0	0	5,500	0
Northeast (Cape Fear) River, N. C	10,700	8,200	0	0	0	0	2,500	0
Pantego Creek and Cucklers Creek, N. C	13,000	13,000	0	0	0	0	0	0
Perquimans River, N. C	2,500	0	0	0	0	0	2,500	0
Six Runs River, N. C	3,500	0	0	0	0	0	3,500	0

CHARLESTON DISTRICT								
Black River, S. C.	4,000	0	0	0	0	0	4,000	0
Buck Creek, S. C.	7,000	2,000	0	0	0	0	5,000	0
Combahee and Broad Rivers, S. C.	6,000	0	0	0	0	0	6,000	0
Johns Island, S. C.	23,000	3,000	0	0	0	0	20,000	0
Lynches River, S. C.	14,200	4,200	0	0	0	10,000	0	0
Reedy River, S. C.	4,000	0	0	0	0	0	4,000	0
Simpson Creek, S. C.	7,400	2,400	0	0	0	0	5,000	0
Waccamaw River, N. C. and S. C.	29,000	25,500	0	$3,500	0	0	0	0
Willow Creek, S. C.	7,100	2,100	0	0	0	0	5,000	0
Yadkin-Pee Dee River, N. C. and S. C.	2,600	2,600	0	0	0	0	0	0
SAVANNAH DISTRICT								
All streams in the State of Georgia flowing into the Atlantic Ocean between the Ogeechee River and Altamaha River	15,000	0	0	0	0	0	15,000	0
Savilla River, Ga.; St. Marys River, Ga. and Fla.; Suwannee River, Ga. and Fla.; for flood control, navigation, and other uses	35,000	1,000	0	0	0	0	20,000	14,000
JACKSONVILLE DISTRICT								
Central and southern Florida	13,000	0	0	3,000	10,000	0	0	0
Chico River, P. R.	2,400	0	0	0	0	0	0	2,400
Estero River et al., Fla.	4,000	0	0	0	0	0	0	4,000
Intercoastal Waterway, Broward County, Fla.	2,400	0	0	0	0	0	0	2,400
Manatee River, Fla.	3,800	0	0	0	0	0	0	3,800
Martin County, Fla.	22,200	0	0	0	0	0	22,200	0
Miami River locks and dam, Florida	7,600	4,600	$3,000	0	0	0	0	0
Orange Lake Basin, Fla.	47,300	35,300	0	0	0	12,000	0	0
Portuguez and Bucana Rivers, P. R.	3,500	0	0	0	0	0	0	3,500
St. Augustine, Fla., and vicinity	4,600	0	0	0	0	0	0	4,600
Streams in St. Johns and Putnam Counties, Fla.	4,700	0	0	0	0	0	0	4,700
Withlacoochee River, Fla.	43,600	22,600	0	0	0	21,000	0	0
West Palm Beach Canal, Fla.	(2)	0	0	0	0	0	0	0
MOBILE DISTRICT								
Alabama-Coosa branch of Mobile River system, Georgia (revision)	100,000	0	0	0	0	30,000	30,000	40,000
Big and Little Cedar Creeks, Ga.	29,900	26,900	0	0	0	0	3,000	0
Big Swamp Creek, Ala.	16,000	4,900	0	0	0	0	11,100	0
Blackwater and Perdidi Rivers, Fla.	7,000	0	0	0	0	0	7,000	0
Blackwater and Yellow Rivers, Fla.	13,500	0	0	0	0	0	13,500	0
Chunky Creek, Chickasawhay and Pascagoula Rivers, Miss.	10,000	8,000	500	0	0	1,500	0	0
Coastal streams, Apalachicola to Suwannee Rivers, Fla.	13,000	0	0	0	0	0	13,000	0
Montgomery, Ala.	17,000	15,000	2,000	0	0	0	0	0
Macoochee and Sautee Rivers, Ga.	6,400	5,400	0	0	0	0	0	1,000
Qostanaula River, Ga.	25,000	0	0	[3] 10,000	10,000	5,000	0	0

[2] Not available.
[3] Additional $5,000 overprogramed.

Schedule of examinations and surveys—General investigations—Continued

FLOOD CONTROL STUDIES—Continued

Name and location of study	Total estimated cost	Fiscal years						Balance needed to complete
		Amount available			Additional amount required			
		To June 30, 1953	1954	1955	1956	1957	1958	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
SOUTH ATLANTIC DIVISION—Continued								
MOBILE DISTRICT—continued								
Pearl River, Miss	$74,000	$9,700	0	$22,000	$15,000	$10,000	$17,300	0
Rome, Ga	34,700	5,600	0	10,000	19,100	0	0	0
Selma, Ala	15,000	3,100	0	0	0	0	11,900	0
Tombigbee River and tributaries, Alabama and Mississippi	294,500	149,800	$9,500	0	0	20,000	55,000	$55,200
Warrior River headwater reservoirs, Alabama (interim report)	128,000	118,000	10,000	0	0	0	0	0
LOWER MISSISSIPPI VALLEY DIVISION								
NEW ORLEANS DISTRICT								
Amite River, La	19,000	2,000	10,000	7,000	0	0	0	0
Streams and bayous in southwest Louisiana west of the West Atchafalaya Basin protection levee	115,000	37,600	1,500	8,000	22,000	20,000	25,900	0
Red River and tributaries, Oklahoma, Texas, Arkansas, and Louisiana, downstream from Denison Dam for bank stabilization	120,000	2,600	0	0	0	10,000	30,000	77,400
Kisatchie Bayou and Cane River, La	20,000	0	0	0	0	13,000	7,000	0
Lake Pontchartrain in Orleans Parish, La	35,000	0	0	0	0	0	0	35,000
Eastern Rapides and south central Avoyelles Parishes, La	20,000	0	0	0	0	0	0	20,000
VICKSBURG DISTRICT								
White and Arkansas Rivers, Grand Prairie region, Arkansas	300,000	0	0	0	0	10,000	20,000	270,000
Bear Creek, Miss	15,000	6,300	0	0	0	0	8,700	0
Big Black River, Miss	15,000	0	0	0	0	0	15,000	0
Boeuf and Tensas Rivers and Bayou Macon, Ark. and La	27,800	27,800	0	0	0	0	0	0
Ouachita River and tributaries, Arkansas and Louisiana, reconstruction of De Gray Reservoir	70,000	0	0	0	0	0	20,000	50,000
MEMPHIS DISTRICT								
Big Creek, Ark	75,000	0	0	0	0	10,000	30,000	35,000
Hatchie-Tuscumbia Rivers, Tenn. and Miss	18,000	7,600	0	0	0	0	0	10,400

Loosahatchie River, Tenn	38,600	3,600	0	0	0	0	0	35,000
Mayfield Creek, Obion Creek and Bayou DuChien, Ky	30,000	5,100	0	0	0	10,000	14,900	0
St. Francis River, Ark. and Mo	175,000	87,100	0	10,000	20,000	20,000	17,900	20,000
Wolf River, Miss. and Tenn	45,000	25,000	7,000	13,000	0	0	0	0
ST. LOUIS DISTRICT								
Big Muddy River and tributaries	65,000	500	0	0	0	0	0	64,500
Cache River	25,000	0	0	0	0	0	0	25,000
East Cape Girardeau, Clear Creek, North Alexander, Preston and Miller Pond drainage and levee districts, Illinois interior drainage	40,000	2,800	0	0	0	0	20,000	17,200
Illinois River and tributaries, Illinois, St. Louis district	230,900	223,300	600	7,000	0	0	0	0
Kaskaskia River, Ill	330,400	313,000	17,400	0	0	0	0	0
Miller City and vicinity, Ill	32,000	28,100	0	0	0	0	0	3,900
Mississippi River, above the mouth of Missouri River agricultural areas	97,000	93,500	1,100	0	0	0	0	2,400
Final report	112,000	57,000	0	0	0	0	0	55,000
Mississippi River, Ohio to Missouri River (Banta resolution):								
Crystal City—Festus, Mo	15,500	0	500	15,000	0	0	0	0
Chouteau Island Drainage District, Ill	20,000	0	0	0	0	0	0	20,000
Interior drainage studies:								
Columbia Drainage and Levee District, Ill	22,000	0	0	0	0	22,000	0	0
Degognia and Fountain Bluff Drainage and Levee District, Ill	39,000	0	0	0	0	0	19,000	20,000
Port Chartres and Ivy Landing Drainage and Levee District, Ill	21,000	0	0	0	0	10,000	11,000	0
Grand Tower Drainage and Levee District	28,000	0	0	0	0	0	10,000	18,000
Harrisonville and Ivy Landing Drainage and Levee District, Ill	25,000	0	0	0	0	10,000	15,000	0
Kaskaskia Island Drainage and Levee District, Ill	25,000	0	0	0	0	0	0	25,000
Prairie duPone Drainage and Levee District, Ill. (including Fish Lake area)	25,000	0	0	0	0	0	25,000	0
Prairie duRocher Drainage and Levee District, Ill	25,000	0	0	0	0	15,000	10,000	0
Stringtown Drainage District, Ill	11,000	0	0	0	0	0	11,000	0
Interim reports on urban areas and agricultural area on right bank miles 123 to 162	25,000	5,700	0	0	0	0	10,000	9,300
Ste. Genevieve, Mo	25,000	0	0	0	0	13,000	12,000	0
Perry County Levee Districts, Nos. 1, 2, and 3, Missouri (interior drainage)	36,000	3,600	0	0	0	0	0	32,400
Richland Creek, Ill	5,500	300	0	0	0	0	0	5,200
St. Louis and vicinity, Missouri	258,000	233,000	25,000	0	0	0	0	0
Ste. Genevieve and St. Marys, Mo	30,400	25,400	0	0	5,000	0	0	0
Salt River, Mo	53,000	38,200	0	0	14,800	0	0	0

Schedule of examinations and surveys—General investigations—Continued

FLOOD CONTROL STUDIES—Continued

Name and location of study	Total estimated cost	Fiscal years						Balance needed to complete
		Amount available			Additional amount required			
		To June 30, 1953	1954	1955	1956	1957	1958	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
SOUTHWESTERN DIVISION								
GALVESTON DISTRICT								
Austin-Washington Soil Conservation District, Texas	$64,500	0	0	0	0	0	0	$64,500
Bastrop-Fayette Soil Conservation District, Texas	46,000	0	0	0	0	0	0	46,000
Brazoria-Galveston Soil Conservation District, Texas	132,600	$2,600	0	0	0	0	0	130,000
Buffalo Bayou, Tex	125,000	0	0	0	0	0	0	125,000
Calhoun-Victoria Soil Conservation District, Texas	97,900	2,900	0	0	0	0	$30,000	65,000
Copana Bay Soil Conservation District, Texas	54,600	0	0	0	0	0	0	54,600
Lower Rio Grande Valley, Tex	7,600	6,600	0	0	0	0	0	1,000
Matagorda County Soil Conservation District, Texas	95,600	6,200	0	0	0	0	0	89,400
Middle Guadalupe Basin Soil Conservation District, Texas	6,000	0	0	0	0	0	6,000	0
Navasota Soil Conservation District, Texas	59,900	0	0	0	0	0	0	59,900
Port Arthur-Sabine Lake erosion, Texas	7,300	6,400	$400	$500	0	0	0	0
San Jacinto River and Cypress Creek, Tex	68,100	61,400	0	0	0	0	0	6,700
Texas City Seawall, Tex	32,000	28,500	2,000	1,500	0	0	0	0
Trinity Bay Soil Conservation District, Texas	59,700	18,500	5,500	17,400	$18,300	0	0	0
Guadalupe-San Antonio Rivers and tributaries, Texas	70,000	0	0	0	0	0	0	70,000
FORT WORTH DISTRICT								
Davidson Creek, Burleson County, Tex	10,000	0	0	0	0	0	0	10,000
Colorado River and tributaries, Texas	329,300	110,200	0	0	0	0	50,000	169,100
Neches River and tributaries, Texas	90,000	7,300	0	0	0	0	0	82,700
Nueces River and tributaries, Texas	261,200	180,200	0	0	0	0	0	81,000
Sabine River and tributaries, Texas	100,000	3,500	0	0	0	$15,000	25,000	56,500
Trinity River and tributaries, Texas	205,900	49,600	0	0	0	0	0	156,300
Trinity River in the Richland, Chambers and Cedar Creek areas, Texas (interim report)	98,700	13,700	25,000	10,000	0	0	0	50,000
Clear Fork of Brazos River, Tex	142,500	0	0	0	0	0	0	142,500
North Bosque River (Brazos River, Tex.)	60,000	0	0	0	0	0	0	60,000
Trinity River-Lake Liberty, Tex	210,000	31,100	0	25,000	20,700	20,000	25,000	88,200
Pecan Bayou (revision)	20,000	0	0		0	0	0	20,000
Devils River, Ozona, Tex	37,000	0	0	0	7,000	0	30,000	0
Brazos River and tributaries	(2)							

Sanchez Creek, Parker County, Tex	5,000	0	0	0	0	0	0	5,000
Streams in vicinity of Alice, Tex	5,000	0	0	0	0	0	0	5,000
ALBUQUERQUE DISTRICT								
Rio Grande at Socorro, N. Mex	25,000	0	4,100	10,000	10,900	0	0	0
Rio Grande at Los Cruces, N. Mex	5,000	0	0	0	0	5,000	0	0
Spring River and Rio Hondo, N. Mex	15,000	0	0	0	15,000	0	0	0
Pecos River at Carlsbad, N. Mex	(2)							
Pecos River and tributaries, New Mexico	472,700	471,700	1,000	0	0	0	0	0
LITTLE ROCK DISTRICT								
Village Creek, Jackson and Lawrence Counties, Ark	32,000	0	0	0	0	10,000	22,000	0
Fourche LaFave Basin, Ark	15,000	0	0	0	0	0	0	15,000
Plum Bayou, Pulaski, Lonoke, and Jefferson Counties, Ark	36,900	4,900	0	0	0	15,000	17,000	0
Village Creek, White River and Mayberry Levee Districts, Jackson and Woodruff Counties, Ark	1,500	0	0	1,500	0	0	0	0
TULSA DISTRICT								
Squaw and East Cache Creeks, Lawton, Okla	5,000	0	0	0	0	0	0	5,000
MISSOURI RIVER DIVISION								
KANSAS CITY DISTRICT								
Big Creek, vicinity of Hays, Kans	3,500	1,000	0	0	0	0	2,500	0
Creve Coeur Creek, Mo	5,000	0	0	0	0	0	5,000	0
Fishing River, vicinity of Excelsior Springs, Mo	24,500	24,500	0	0	0	0	0	0
Gasconade River at Newburg, Mo	7,000	400	0	0	0	0	6,600	0
Grand River, Mo	312,100	312,100	0	0	0	0	0	0
Kansas City, Mo. and Kansas River	5,000	5,000	0	0	0	0	0	0
Kansas River, Kans., including bank stabilization	80,000	0	20,000	20,800	20,000	19,200	0	0
Lamine and Blackwater River, Mo	90,000	17,400	9,000	10,000	14,000	15,000	24,600	0
Missouri River, vicinity of Leavenworth, Kans	4,000	0	0	0	0	0	0	4,000
Missouri River, Watson, Mo. to Leavenworth, Kans	10,000	800	0	0	0	9,200	0	0
Nemaha and Little Nemaha River, Nebr. and Kans	166,700	86,500	10,000	0	0	10,000	20,000	40,200
Nodaway River, Mo	31,700	2,700	0	0	0	0	0	29,000
Platte River, Mo	146,300	106,300	0	0	0	0	10,000	30,000
Republican River and tributaries	29,000	0	0	0	0	0	14,000	15,000
Republican River, vicinity of Wray, Colo	8,000	0	0	0	0	0	0	8,000
Squaw and Little Tarkio Creek and Big Tarkio River, Mo	31,400	24,500	0	0	0	0	6,900	0
Black Vermillion River at Frankfort, Kans	12,100	9,300	0	2,800	0	0	0	0
Wears Creek, vicinity of Jefferson City, Mo	43,200	41,600	0	1,600	0	0	0	0

[2] Not available.

Schedule of examinations and surveys—General investigations—Continued

FLOOD CONTROL STUDIES—Continued

Name and location of study	Total estimated cost	Fiscal years						Balance needed to complete
		Amount available			Additional amount required			
		To June 30, 1953	1954	1955	1956	1957	1958	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
MISSOURI RIVER DIVISION—Continued								
OMAHA DISTRICT								
Aowa and South Creeks, Nebr	$8,000	$600	0	0	0	0	0	$7,400
Bow Creek, Nebr	9,500	1,900	0	0	0	0	0	7,600
Cheyenne River, S. Dak., and Wyo	25,000	0	0	0	$12,000	$13,000	0	0
Floyd River, Iowa	99,700	47,700	$35,000	$17,000	0	0	0	0
Golden, Colo	27,300	7,300	0	0	0	0	0	20,000
Grand River, S. Dak	15,000	5,200	0	0	0	0	0	9,800
Greeley, Colo	34,500	4,500	0	0	0	0	$20,000	10,000
Indian Creek, Iowa	3,000	0	0	0	0	3,000	0	0
James River, N. Dak., and S. Dak	96,000	21,200	0	24,800	5,000	23,000	22,000	0
Missouri River, N. Dak., S. Dak., and Nebr	15,000	0	0	0	0	0	0	15,000
Moreau River, S. Dak	15,000	3,200	0	0	0	0	0	11,800
Nishnabotna River, Iowa	85,000	19,700	0	0	0	10,000	25,300	30,000
Omaha Creek, Nebr	40,600	6,200	0	0	0	0	0	34,400
Perry Creek, Iowa	60,000	20,600	0	0	0	10,000	19,400	10,000
Papillion Creek, Nebr	54,600	6,600	0	0	0	0	0	48,000
Platte River, Nebr	264,500	125,000	7,500	20,000	15,000	20,000	30,000	47,000
Sand Creek, Colo	5,000	1,200	0	0	0	0	3,800	0
Shell Creek, Nebr	67,300	67,300	0	0	0	0	0	0
Vermillion River, S. Dak	3,000	0	0	3,000	0	0	0	0
Weeping Water Creek, Nebr	50,000	10,100	0	0	0	0	0	39,900
GARRISON DISTRICT								
Cannonball River, N. Dak	50,000	33,200	10,000	6,800	0	0	0	0
Heart River, N. Dak	58,800	52,800	0	6,000	0	0	0	0
James River, N. Dak., portion	63,000	60,900	0	0	0	2,100	0	0
Little Missouri River, Mont. and N. Dak	42,000	15,200	0	0	0	0	0	26,800
FORT PECK DISTRICT								
Jefferson, Madison, and Gallatin Rivers, Mont	10,000	0	0	0	0	10,000	0	0
Sun River, Mont	50,000	3,600	10,000	15,000	5,000	16,400	0	0

	30,000	3,000	10,000	15,000	5,000	16,400	0	0
								0

OHIO RIVER DIVISION

NASHVILLE DISTRICT

Big South Fork, Tenn. and Ky., Cumberland River Basin	30,000	5,100	0	3,000	15,000	6,900	0	0
Clarks River, Ky., Tennessee River Basin	30,000	900	0	0	0	10,000	19,100	0
Elk River, Tenn., Tennessee River Basin	4,000	0	0	0	0	0	0	4,000
First Creek, Tenn., Tennessee River Basin	35,000	19,800	0	0	0	15,200	0	0
Flint Creek, Ala., Tennessee River Basin	4,000	0	0	0	0	0	4,000	0
Flint River, Ala., and Tenn., Tennessee River Basin	28,000	28,000	0	0	0	0	0	0
French Broad River, above Douglas Dam, Tenn. and N. C. (revision)	1,500	0	0	0	0	1,500	0	0
Laurel River, Ky., Cumberland River Basin	17,500	0	0	0	0	0	2,500	15,000
Little River, Hopkinsville, Ky., Cumberland River Basin	17,000	15,500	0	0	1,500	0	0	0
Lynn Camp Creek, Ky., Cumberland River Basin	2,500	0	0	0	0	0	2,500	0
Mud Creek, Ala., Tennessee River Basin	4,000	300	0	0	0	0	3,700	0
Pinhook Creek, Ala., Tennessee River Basin	35,000	1,400	0	0	0	10,000	18,600	5,000
Soddy Creek, Tenn., Tennessee River Basin	15,000	700	0	0	0	0	0	14,300

LOUISVILLE DISTRICT

Bay Creek and tributaries, Illinois	4,000	0	0	0	0	0	4,000	0
Blue River at Salem, Ind	26,700	14,300	0	0	0	0	0	12,400
Cache River, Ill	36,000	0	0	0	0	0	15,000	21,000
Embarass River, Villa Grove, Ill	29,400	27,900	0	0	1,500	0	0	0
Highland Creek and trblutaries, Kentucky	24,000	200	0	0	0	0	0	23,800
Humphreys, Clanton, and Chawnee Creeks, Ballard County, Ky	29,000	0	0	0	0	0	0	29,000
Indian Creek at Corydon, Ind	39,600	39,600	0	0	0	0	0	0
Kentucky River and tributaries, Kentucky	160,000	0	2,000	10,000	20,000	40,000	40,000	48,000
Little Wabash River, Ill	22,000	6,700	0	0	0	10,000	5,300	0
Mad River above Huffman Dam, Ohio	43,000	3,000	0	[1] 0	10,000	30,000	0	0
Ohio River at Sturgis, Ky	23,000	0	0	0	0	0	0	23,000
Panther Creek, Daviess County, Ky	40,000	0	0	0	0	0	0	40,000
Patoka River Basin, Ind	70,000	35,000	0	0	0	0	0	35,000
Salt River, Ky	55,000	0	0	0	0	0	0	55,000
Wabash River above mouth of White River, Ind	260,000	25,800	23,000	25,000	25,000	40,000	50,000	71,200
Wabash Levee District No. 3, Illinois	2,000	0	0	0	0	0	0	2,000
White River, Ind	223,500	16,000	0	0	0	0	50,000	157,500

HUNTINGTON DISTRICT

Big Sandy River, Ky, W. Va., and Va	50,000	0	0	10,000	20,000	20,000	0	0
Brush Creek, W. Va	31,000	28,000	0	3,000	0	0	0	0
Cherry River at Richwood, W. Va	20,000	0	0	0	0	0	20,000	0
Connotton Creek, Ohio	5,000	0	0	0	0	0	5,000	0
Dewey Dam and Reservoir, Ky	15,000	0	0	0	0	0	0	15,000
Hocking River, Ohio	23,800	12,400	0	0	0	0	0	11,400
Kokosing River, Ohio	33,000	6,100	0	0	15,000	11,900	0	0
Leatherwood Creek, Ohio	56,900	51,900	0	5,000	0	0	0	0
Little Kanawha River, W. Va	4,000	3,500	0	0	0	0	0	500
Little Sandy River and Tygarts Creek, Ky	8,900	1,400	4,000	3,500	0	0	0	0
Meadow River, W. Va	25,700	23,200	0	2,500	0	0	0	0
Moxahala and Jonathan Creeks, Ohio	5,000	0	0	0	0	0	5,000	0
Pomeroy, Ohio	2,500	0	0	0	0	0	0	2,500
Scioto River, Ohio	123,700	98,700	0	0	0	0	15,000	10,000
Scioto-Sandusky River, Ohio	4,500	4,500	0	0	0	0	0	0

[1] Additional $5,000 overprogramed.

Schedule of examinations and surveys—General investigations—Continued

FLOOD CONTROL STUDIES—Continued

Name and location of study	Total estimated cost	Fiscal years						Balance needed to complete
		Amount available			Additional amount required			
		To June 30, 1953	1954	1955	1956	1957	1958	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
OHIO RIVER DIVISION—Continued								
PITTSBURGH DISTRICT								
Allegheny River at Coudersport, Pa	$21,700	$20,200	0	0	- $1,500	0	0	0
Allegheny River and Oil Creek, Pa. (revision)	[3]							
Allegheny River at Salamanca, N. Y	28,500	0	0	0	0	0	$28,500	0
Beaver River Basin, Ohio and Pa	25,800	0	0	0	0	0	0	$25,800
Buffalo Creek at Mannington, W. Va	31,500	0	0	0	0	0	31,500	0
Buffalo Creek, Marion County, W. Va	9,500	0	0	0	0	0	9,500	0
Chartiers Creek, at Washington, Pa	40,000	9,100	0	$10,000	20,900	0	0	0
Connoquenessing Creek, Butler, Pa	5,000	0	0	5,000	0	0	0	0
Eldred and vicinity, Pennsylvania	31,400	28,200	$200	0	0	$3,000	0	0
French Creek, Basin, Pa	11,000	6,000	1,300	3,700	0	0	0	0
Girtys Run, Pa	16,500	0	0	0	0	16,500	0	0
Johnstown Channel extension, Pennsylvania	31,500	0	0	0	0	0	31,500	0
Mahoning-Grand River, Ohio	52,300	47,300	5,000	0	0	0	0	0
Sandy Lick Creek at Brookville, Pa	7,500	0	0	7,500	0	0	0	0
Sandy Lick Creek at DuBois, Pa	[3]							
Turtle Creek, Pa	72,300	10,800	0	0	10,000	30,000	21,500	0
Upper Allegheny River Basin, N. Y. and Pa	160,000	72,900	0	0	0	0	30,000	57,100
West Fork River, W. Va	81,500	65,400	12,800	3,300	0	0	0	0
Youghiogheny River Basin, Pa. and Md	6,500	0	0	0	0	0	6,500	0
NORTH CENTRAL DIVISION								
ROCK ISLAND DISTRICT								
Bureau Creek, Ill	22,300	2,600	0	0	0	0	19,700	0
Rock River, Ill. and Wis	71,500	27,900	12,300	31,300	0	0	0	0
Des Moines River, Iowa:								
Interim report	148,000	129,900	6,700	7,400	[4] 4,000	0	0	0
Final report	95,000	19,700	0	0	0	0	25,000	50,300
Iowa and Cedar Rivers, Iowa and Minn.:								
Interim report	304,100	259,200	0	0	0	25,000	19,900	0
Final report	100,000	0	0	0	0	50,000	50,000	0
Maquoketa River, Iowa	36,500	1,200	0	0	0	0	25,000	10,300

Skunk River, Iowa	90,800	65,500	0	0	0	25,300	0	0
Turkey River, Iowa	48,000	1,700	0	0	0	0	14,300	32,000
Pecatonica River, Wis. and Ill	41,200	19,200	2,700	3,600	15,700	0	0	0
Mississippi River above mouth of Ohio River:								
Interim report (urban areas)	184,000	14,200	0	0	16,200	50,000	50,000	53,600
Final report	116,000	20,000	0	0	0	0	50,000	46,000
ST. PAUL DISTRICT								
Cannon River, Minn. (Straight River and Crane Creek)	5,000	0	0	0	0	5,000	0	0
Chippewa River, Wis	184,600	140,400	0	0	0	0	0	44,200
Coon Creek, Wis	4,000	0	0	0	0	4,000	0	0
Kickapoo River, Wis	130,000	95,700	0	0	15,000	19,300	0	0
Little Fork River, Minn	5,000	0	0	0	0	5,000	0	0
Minnesota River, Minn:								
Main report	260,500	189,400	0	0	0	30,000	41,100	0
Main stem communities	50,000	2,600	8,400	1,200	10,000	27,800	0	0
Mankato-North Mankato (interim report)	52,500	44,700	3,300	4,500	0	0	0	0
Mississippi River, Coon Rapids to mouth of Ohio River:								
Main report	71,700	8,200	0	0	0	0	20,000	43,500
Winona, Minn. (interim report)	38,300	32,000	6,300	0	0	0	0	0
St. Paul, South St. Paul (interim report)	63,000	10,000	39,600	13,400	0	0	0	0
Pembina River and tributaries, North Dakota	92,200	71,500	0	27,700	0	0	0	0
Poplar River, Wis	25,000	0	0	0	0	0	10,000	15,000
Red River of the North, basin:								
Main report	220,000	5,400	0	0	16,600	50,000	75,000	73,000
Grafton, N. Dak. (interim report)	25,000	300	0	0	0	0	0	24,700
Crookston, Minn., (interim report)	55,000	21,500	600	23,500	9,400	0	0	0
Root River, Minn:								
Main report	113,000	68,800	0	0	0	0	0	44,200
Rushford (interim report)	6,000	0	0	6,000	0	0	0	0
Roseau River, Minn	135,000	107,600	8,300	19,100	0	0	0	0
Ruffy Brook, and Lost River, Minn	42,400	40,000	2,000	400	0	0	0	0
St. Croix River and tributaries, Wisconsin	10,000	0	0	0	0	10,000	0	0
Snake River, vicinity of Pine City, Minn	7,000	0	0	0	0	0	0	7,000
Souris (Mouse) River, N. Dak	11,200	7,200	0	0	4,000	0	0	0
South Fork of Crow River, Minn	52,500	50,000	2,500	0	0	0	0	0
Whitewater River, Minn	4,000	0	0	0	0	0	4,000	0
Wisconsin River, Wis	95,500	41,700	0	0	0	0	0	53,800
Zumbro River, Minn	6,000	0	0	0	0	6,000	0	0
Lake of the Woods, Minn	37,000	0	0	(7)	25,000	12,000	0	0
DULUTH DISTRICT								
All streams and rivers flowing into Lake Superior in Ashland, Bayfield, and Douglas Counties, Wis	25,000	15,100	0	0	0	0	0	9,900
St. Louis River, Minn. and Wis	3,000	0	0	0	0	3,000	0	0

[5] Not available.
[6] To be allocated in fiscal year 1955 if available.
[7] $12,000 overprogramed.

Schedule of examinations and surveys—General investigations—Continued

FLOOD CONTROL STUDIES—Continued

Name and location of study	Total estimated cost	Fiscal years						Balance needed to complete
		Amount available			Additional amount required			
		To June 30, 1953	1954	1955	1956	1957	1958	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
NORTH CENTRAL DIVISION—Continued								
MILWAUKEE DISTRICT								
Grand River and tributaries, Michigan	$184,900	$11,700	$4,200	0	$6,500	$25,000	$50,000	$87,500
Grand River, Lansing, Mich	52,000	47,500	2,000	$2,500	0			0
Fox River and tributaries, Wisconsin	157,200	21,200	0	0	0	10,000	40,000	86,000
St. Joseph River, Mich. and Ind	7,500	0	0	0	0	7,500	0	0
Milwaukee River and tributaries, Wisconsin	6,000	400	0	0	0	5,600	0	0
Rangeline Lake to Oconto River, Wis	1,000	0	0	0	0	0	0	1,000
Warroad River and Bulldog Creek	21,000	19,000	1,000	1,000	0	0	0	0
CHICAGO DISTRICT								
Illinois River and tributaries, Illinois, comprehensive report	727,100	695,400	0	31,700	0	0	0	0
Upper Kankakee River Basin, Ill. and Ind	124,000	26,900	0	0	15,000	40,000	42,100	0
Illinois River, vicinity of Lemont, Romeo, and Lockport	14,200	10,700	0	3,500	0	0	0	0
Fox River and tributaries	40,000	0	0	0	0	9,000	31,000	0
DETROIT DISTRICT								
Au Gres River, Mich	28,600	2,600	0	0	5,000	21,000	0	0
Kawkawlin River, Mich	20,200	2,600	0	0	2,500	15,100	0	0
River Rouge, Mich	42,300	4,900	0	0	0	27,400	10,000	0
Huron River, Mich	4,000	1,400	0	0	0	2,600	0	0
Maumee River, Ind. and Ohio	313,000	126,700	29,900	20,000	9,800	50,000	50,000	26,600
BUFFALO DISTRICT								
Angelica Creek, N. Y	3,600	3,600	0	0	[4] 0	0	0	0
Lyons, N. Y. and vicinity	[2]			0	[4] 0			
Marsh Creek, vicinity, Geneva, N. Y	3,400	3,400	0	0	[4] 0	0	0	0
Oneida Creek at Oneida, N. Y	22,200	22,200	0	0	[4] 0	0	0	0
Smokes Creek, Lackawanna, N. Y	15,000	0	0	0	0	15,000	0	0
Tonawanda Creek and tributaries, New York	[2]				[4] 0			

Bellevue, Ohio and vicinity	10,700	1,100	0	0	0	0	0	9,600
Chagrin River, Ohio	12,300	0	0	0	0	12,300	0	0
Sandusky River, Ohio	37,000	30,900	0	0	6,100	0	0	0
Conneaut Creek, vicinity of Conneautville, Pa	7,200	0	0	0	0	7,200	0	0
SOUTH PACIFIC DIVISION								
LOS ANGELES DISTRICT								
Animas River, Colo. and N. Mex	66,000	9,600	0	0	0	0	0	56,400
Antelope Valley, Calif	7,000	0	0	0	0	0	7,000	0
Arroyo Grande Creek, Calif	25,000	0	0	0	0	10,000	15,000	0
Colorado River and tributaries, above Lee Ferry, Ariz	127,100	45,200	0	5,000	10,000	15,000	15,000	36,900
Dolores River at Dolores, Colo	40,000	0	0	0	0	0	0	40,000
Fortification Creek, Craig, Colo	[2]							
Gila River and tributaries, Arizona and New Mexico	880,100	714,400	0	0	0	0	0	165,700
Gila and Salt Rivers, Ariz	31,600	25,600	0	6,000	0	0	0	0
Gila River below Painted Rock Dam, Ariz	40,000	0	0	0	0	0	20,000	20,000
Gila River, Pinal Creek (interim)	50,000	0	0	0	0	0	10,000	40,000
Kanab Creek, Utah and Ariz	49,200	10,200	0	0	0	0	0	39,000
Laguna Canyon, Calif	23,900	4,700	0	0	0	0	0	19,200
Laguna Dominguez, Calif	30,000	0	0	0	0	0	0	30,000
Las Chollas Creek, Calif	46,900	5,000	0	0	0	0	20,000	21,900
Las Vegas Wash and tributaries, Nevada	6,000	0	0	0	0	6,000	0	0
Little Colorado River, N. Mex	40,000	0	0	0	0	0	10,000	30,000
Mojave River, Calif	133,200	83,600	18,000	10,000	10,000	11,600	0	0
Santa Margarita River, Calif	2,000	0	0	0	0	0	2,000	0
Streams flowing into Salton Sea	110,100	11,200	0	0	0	0	20,000	78,900
San Dieguito River, Calif	95,500	92,500	0	3,000	0	0	0	0
San Luis Rey River, Calif	48,000	0	0	0	0	0	0	48,000
Switzer Creek, Calif	35,000	5,000	0	0	0	0	0	30,000
Santa Ynez River and tributaries, California	157,200	147,200	0	0	0	0	0	10,000
Virgin River and tributaries, Nevada, Arizona, and Utah	145,100	115,200	0	0	0	0	0	29,900
Whitewater River, Calif	220,200	160,600	0	0	10,000	25,000	24,600	0
SAN FRANCISCO DISTRICT								
Alameda Creek, Calif	101,600	20,700	11,800	10,000	15,000	25,000	19,100	0
Big Sur River and tributaries, California	2,000	100	0	0	0	0	0	1,900
Carmel River and tributaries, California	5,000	100	0	0	0	0	0	4,900
Corte Madera Creek, Calif	63,500	7,800	0	0	0	0	25,000	30,700
Eel River, Calif	143,200	93,000	0	0	0	0	0	50,200
Eel River, Calif. (interim revision)	6,000	0	6,000	0	0	0	0	0
Guadalupe River and adjacent streams, California	86,000	28,100	0	4,000	7,000	15,000	21,900	10,000
Iao Stream, Maui, T. H	26,600	7,200	400	0	0	0	19,000	0
Klamath River, Oreg., and Calif	123,300	54,600	0	0	0	0	0	68,700
Napa River, Calif	54,800	9,500	0	0	0	0	0	45,300
Novato Creek and tributaries, California	36,600	4,700	0	0	0	0	0	31,900
Pajaro River, Calif	75,400	16,500	0	0	0	0	0	58,900
Palolo and Manoa Valleys, Oahu, T. H	5,000	0	0	0	0	0	0	5,000
Petaluma Creek, Calif	54,600	6,100	0	0	0	0	0	48,500
Reclamation District 768, Humboldt County, Calif	4,600	0	0	0	0	0	0	4,600
Redwood Creek, Humboldt County, Calif	5,000	0	0	0	0	0	0	5,000

[2] Not available.
[4] Reports to be completed with NENYIAC funds.

Schedule of examinations and surveys—General investigations—Continued

FLOOD CONTROL STUDIES—Continued

Name and location of study	Total estimated cost	Fiscal years						Balance needed to complete
		Amount available			Additional amount required			
		To June 30, 1953	1954	1955	1956	1957	1958	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
SOUTH PACIFIC DIVISION—Continued								
SAN FRANCISCO DISTRICT—continued								
Salinas River, Calif.	$287,200	$283,500	$1,700	$2,000	0	0	0	0
Smith River, Calif.	10,000	0	0	0	0	$10,000	0	0
Sonoma Creek, Calif.	9,000	0	0	0	0	0	0	$9,000
Wailua River, Kauai, T. H.	4,000	0	0	0	0	0	0	4,000
Waimea River, Kauai, T. H.	20,000	16,000	1,500	2,500	0	0	0	0
SACRAMENTO DISTRICT								
Bear River, Utah, Idaho, and Wyo.	100,000	13,400	0	0	0	0	0	86,600
Bear Creek, San Joaquin County, Calif.	25,000	0	0	0	0	0	0	25,000
Calaveras River, Calif.	30,000	1,200	0	0	0	0	0	28,800
Caliente Creek, stream group, California	35,000	32,000	0	0	0	3,000	0	0
Carson River, Nev. and Calif.	100,000	58,100	0	0	0	0	0	41,900
Dry Creek, near Roseville, Calif.	10,000	300	0	0	0	0	0	9,700
Gleason Creek, Ely, Nev.	6,000	0	0	6,000	0	0	0	0
Jordan River Basin, Utah	200,000	136,700	0	0	0	0	$15,000	48,300
Jordan River Basin, Utah, interim	75,000	12,900	0	15,000	$15,000	20,000	12,100	0
Martin Creek, Paradise Valley, Nev.	6,000	0	0	0	0	0	0	6,000
Mokelumne River stream group, California	150,000	18,700	0	0	0	0	0	131,300
Poso and Deer Creeks and White River stream group, California	45,000	3,900	0	0	0	0	0	41,100
Sacramento-San Joaquin Delta, Calif.	100,000	41,500	13,200	7,000	6,000	14,000	18,300	0
Sevier River Basin, Utah	100,000	9,600	0	0	0	0	0	90,400
Truckee River, Calif. and Nev.	175,000	130,700	0	0	0	20,000	24,300	0
Walker River, Calif. and Nev.	75,000	18,200	0	0	0	0	0	56,800
Walnut Creek, Calif.	29,000	0	0	0	10,000	19,000	0	0
Sacramento River, Chico Landing-Red Bluff, Calif.	29,400	28,400	1,000	0	0	0	0	0

NORTH PACIFIC DIVISION								
PORTLAND DISTRICT								
Beaver Creek, Oreg	11,000	0	0	0	0	0	0	11,000
Coquille River and tributaries, Oregon	35,000	0	0	0	0	0	0	35,000
Cowlitz River, Wash	57,500	5,400	0	0	0	0	0	52,100
Crooked River, Oreg	22,100	5,900	0	0	0	0	0	16,200
Dry Hollow, Oreg	8,500	0	0	0	8,500	0	0	0
John Day River, Oreg	73,000	29,800	0	0	0	0	0	43,200
Lower Columbia River, Oreg. and Wash	351,800	314,800	400	0	0	0	16,000	20,600
Luckiamute River and Rickreall-La Creole Creek, Oreg	5,600	0	0	0	0	0	0	5,600
Nestucca River and tributaries, Oregon	26,700	11,400	0	0	0	0	0	15,300
Rogue River and tributaries, Oregon	105,800	64,100	0	0	0	0	20,000	21,700
Silvies River and tributaries, Oregon	89,300	52,800	0	10,500	15,000	11,500	0	0
Siuslaw River, Oreg	6,500	100	0	0	0	6,400	0	0
Two Mile Creek, Oreg	5,000	0	0	0	0	0	0	5,000
Umpqua River, Oreg	105,000	57,900	0	0	0	0	0	47,100
Willow Creek at Heppner, Oreg	9,900	9,900	0	0	0	0	0	0
Yamhill River, Oreg	55,000	33,500	0	0	0	0	0	21,500
Yaquina River and tributaries, Oregon	12,000	800	0	0	0	0	0	11,200
John Day project, Washington and Oregon	25,000	0	0	0	0	0	0	25,000
Tualatin River, Oreg	214,800	199,300	15,500	0	0	0	0	0
SEATTLE DISTRICT								
Cedar River, Wash	21,000	9,000	0	0	6,000	6,000	0	0
Chehalis River and tributaries, Washington	150,000	47,300	0	0	0	0	0	102,700
Flathead River, Mont	2,000	0	0	0	0	0	2,000	0
Kootenai River, Idaho	50,000	0	0	0	00,000	15,000	25,000	0
Nooksack River, Wash	56,900	56,900	0	0	0	0	0	0
Okanogan River, Wash	28,000	14,200	3,800	10,000	0	0	0	0
Samish River, Wash	4,500	0	0	0	0	4,500	0	0
Skagit River and tributaries, Washington	231,200	230,200	1,000	0	0	0	0	0
Skokomish River and tributaries, Washington	7,500	500	0	0	0	7,000	0	0
Snohomish River and tributaries, Washington	55,900	55,300	600	0	0	0	0	0
Wynooche River, Wash	[1]							
Yakima River and tributaries, Washington	252,800	250,900	1,400	500	0	0	0	0
WALLA WALLA DISTRICT								
Grande Ronde River and tributaries, Oregon	120,000	84,900	0	0	0	0	0	35,100
Mill Creek, tributary of Walla Walla River, Wash	58,400	18,500	0	0	0	0	0	39,900
Palouse River and tributaries, Washington	27,000	100	0	0	0	0	0	26,900
Portneuf River and Marsh Creek, Idaho	58,500	52,600	0	5,900	0	0	0	0
Powder River and tributaries, Oregon	40,000	6,000	0	0	0	0	0	34,000
Salmon River at Challis, Idaho	6,000	0	0	0	0	0	6,000	0
Touchet River and tributaries, Washington	40,000	15,500	0	0	0	10,000	14,500	0
Umatilla River, Oreg	178,800	166,700	4,600	7,500	0	0	0	0
Middle Snake River, Idaho	144,400	0	144,400	0	0	0	0	0
Upper Snake River, Idaho	892,000	0	0	47,000	50,000	100,000	100,000	595,000
Walla Walla River-Milton-Freewater to Mill Creek, Wash	13,500	0	0	0	0	0	0	13,500
Yakima River at Richland, Wash	3,000	0	0	0	3,000	0	0	0
Zintell Canyon, tributary of Columbia River (Kennewick), Wash	2,500	0	0	0	2,500	0	0	0

[1] Not available.

Schedule of examinations and surveys—General investigations—Continued

FLOOD CONTROL STUDIES—Continued

Name and location of study	Total estimated cost	Fiscal years						Balance needed to complete
		Amount available			Additional amount required			
		To June 30, 1953	1954	1955	1956	1957	1958	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
NORTH PACIFIC DIVISION—Continued								
ALASKA DISTRICT								
Alaska 308 report	$775,000	$628,100	$10,000	$20,000	$15,000	$30,000	$40,000	$31,900
Transfer to NENYIAC	8,300	0	8,300	0	0	0	0	0
Total, flood-control studies	27,736,900	13,543,100	660,000	775,000	800,000	1,835,000	2,768,400	7,355,400

[1] Not available.

BEACH EROSION COOPERATIVE STUDIES

NEW ENGLAND DIVISION								
State of Connecticut:								
Area 9	$7,175	$7,175	0	0	0	0	0	0
Area 10	5,350	5,350	0	0	0	0	0	0
Areas 8 and 11	11,925	11,925	0	0	0	0	0	0
Pemberton to Gurnet Point, Mass	5,000	0	$950	$4,050	0	0	0	0
Chatham, Mass	7,500	0	0	3,150	$4,350	0	0	0
Saco River to Pine Point, Maine	7,000	0	0	0	0	$7,000	0	0
Newport, R. I	8,000	0	0	0	0	8,000	0	0
NORTH ATLANTIC DIVISION								
NEW YORK DISTRICT								
Fire Island Inlet to Jones Beach, Long Island, N. Y	10,000	0	0	10,000	0	0	0	0
Fire Island Inlet to Montauk Point (Suffolk County), Long Island, N. Y	25,000	0	0	2,600	22,400	0	0	0
PHILADELPHIA DISTRICT								
State of Delaware, Fenwick Island to Hummock Point, Del	27,000	0	0	27,000	0	0	0	0
State of New Jersey, Barnegat Inlet to Cape May	43,500	0	0	29,000	14,500	0	0	0

NORFOLK DISTRICT								
Princess Anne County, Va	10,000	0	0	0	0	10,000	0	0
SOUTH ATLANTIC DIVISION								
WILMINGTON DISTRICT								
Carolina Beach, N. C	2,050	2,050	0	0	0	0	0	0
CHARLESTON DISTRICT								
St. Simon Island, Ga	7,500	0	0	0	0	7,500	0	0
JACKSONVILLE DISTRICT								
Fort Pierce, Fla	10,000	0	0	0	0	10,000	0	0
Palm Beach County, Fla	15,000	0	0	0	15,000	0	0	0
NORTH CENTRAL DIVISION								
MILWAUKEE DISTRICT								
Kenosha, Wis	4,000	4,000	0	0	0	0	0	0
Manitowoc, Wis	5,400	0	5,400	0	0	0	0	0
St. Joseph, Mich	4,300	0	0	4,300	0	0	0	0
BUFFALO DISTRICT								
Braddock Bay, Lake Ontario, N. Y	4,000	0	4,000	0	0	0	0	0
Hamlin Beach, Lake Ontario, N. Y	4,000	4,000	0	0	0	0	0	0
Evangola State Park, N. Y	7,500	0	0	0	7,500	0	0	0
Michigan line to Marblehead, Ohio	10,000	0	0	0	0	10,000	0	0
SOUTH PACIFIC DIVISION								
SAN FRANCISCO DISTRICT								
State of California, application III	17,000	17,000	0	0	0	0	0	0
Waimea and Hanapepe, T. H	11,150	9,350	1,300	0	0	0	0	0
Humboldt Bay, Calif	4,400	0	0	4,400	0	0	0	0
Oahu, T. H	25,000	0	0	0	0	25,000	0	0
LOS ANGELES DISTRICT								
State of California:								
Application IV, phase 1	15,000	1,650	13,350	0	0	0	0	0
Application IV, phase 2	15,000	0	0	0	15,000	0	0	0
Application V, phase 1	15,000	0	0	15,000	0	0	0	0
Application V, phase 2	15,000	0	0	0	15,000	0	0	0
Other probable studies fiscal years 1956, 1957, and 1958 [1]	181,250	0	0	0	6,250	75,000	$100,000	0
Totals, beach erosion cooperative studies, say	540,000	62,500	25,000	100,000	100,000	152,500	100,000	

[1] Beach erosion cooperative studies usually result where urgent problems exist and in many cases authorization and allocation of funds are necessarily made immediately after receipt of application; therefore budgeting more than 1 year in advance requires that funds be estimated for use at localities whose problems may be presently unknown. A growing backlog of applications has resulted from curtailment of studies and appropriations therefor during the Korean war. An allotment of $150,000 in fiscal year 1956 and $100,000 annually thereafter would be expected to keep the program current with public demand.

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Schedule of examinations and surveys—General investigations—Continued

SPECIAL STUDIES

Name and location of study	Total estimated cost	Fiscal years						Balance needed to complete
		Amount available			Additional amount required			
		To June 30, 1953	1954	1955	1956	1957	1958	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
SPECIAL STUDIES								
Arkansas, White, and Red Rivers (comprehensive report)	$2,804,900	$1,929,900	$475,000	$400,000	0	0	0	0
New England-New York resources comprehensive survey	2,934,900	1,684,900	600,000	650,000	0	0	0	0
San Francisco Bay and tributaries, Calif (survey)	2,500,000	0	0	50,000	$250,000	$800,000	$900,000	$500,000
Great Lakes water levels	1,016,000	254,000	50,000	87,500	300,000	324,500	0	0
Passamaquoddy	[1] (1,000,000)	0	0	0	[1] (1,000,000)	0	0	0
Total, special studies	9,255,800	3,868,800	1,125,000	1,187,500	550,000	1,124,500	900,000	500,000
RECAPITULATION								
Navigation studies	9,810,300	4,780,000	330,000	275,000	300,000	886,200	1,096,800	2,142,300
Flood-control studies	27,736,900	13,543,100	660,000	775,000	800,000	1,835,000	2,768,400	7,355,400
BE Coop studies	540,000	62,500	25,000	100,000	100,000	152,500	100,000	0
Special studies	9,255,800	3,868,800	1,125,000	1,187,500	550,000	1,124,500	900,000	500,000
Total, examinations and surveys	47,343,000	22,254,400	2,140,000	2,337,500	1,750,000	3,998,200	4,865,200	9,997,700

[1] Supplemental appropriation anticipated. Not included in totals.

Senator KERR. All right.

General ITSCHNER. I shall proceed then, sir?

Senator KERR. Yes.

General ITSCHNER. I shall proceed with my statement about surveys.

The tentative allocation of general survey funds included in the budget estimate for fiscal year 1956, provides for work on 117 reports of which 55 will be completed. These reports have been selected under criteria which provide for concentration on problems of greatest national significance with due consideration to the factors which affect the efficient use of the limited funds available. And a special effort has been made to concentrate on completing reports on which considerable amounts of money have been spent in prior years.

Senator KERR. Now, I read here the figure under backlog, 1,285 as of 1956, 1,390 as of fiscal 1955. What relationship does that have to the figure of 882 up here of reports in active program?

General ITSCHNER. The difference between 882 and the figure of 1,390 for fiscal year 1955 represents the number of authorizations that are combined with others in reports.

As an example, several authorizations might be combined into one report.

Senator KERR. Are there a number of projects which, if implemented, would require local participation with reference to which such participation is not available and for that reason some of the ones not included in the figure 882 might be included——

General ITSCHNER. There are some such cases where local interests are not interested in participating. In those cases we do submit an unfavorable report pointing out the reason why the project has lost its interest with local people.

Senator KERR. All right.

General ITSCHNER. In addition to navigation and flood-control studies the survey program includes cooperative beach erosion studies which are financed half by the United States and half by local agencies, usually the States. There are 18 such reports now outstanding in the field and arrangements for 7 more are under consideration.

The survey program also includes special studies for which four are underway at this time.

The comprehensive interagency reports on the Arkansas-White-Red River Basin and on the New York-New England resources study are in the final stages of completion.

Senator KERR. Can you tell me if those two reports will come here simultaneously or at different dates?

General ITSCHNER. They will come at different dates, sir. The New York-New England resources study is ahead of the Arkansas-White-Red River Basin study, but both will be in this calendar year. The New York-New England resources study will probably be to Congress by the end of this fiscal year and the AWR report by the end of the calendar year, possibly somewhat ahead of that.

Senator KERR. Senator Symington, this is General Itschner, and this morning we had the Chief of Engineers in a very interesting review of the program of the Corps of Engineers and some of their problems, both problems with which they are directly concerned and problems in which the Congress is directly and indirectly concerned. The general here is answering some questions submitted

to him in March with reference to the civil works program and he has been discussing the status of authorized civil works examinations and surveys.

He has just brought out a very dramatic fact, and that is that there are 882 live surveys and reports in their active program but that due to directives from the budget they did not ask for more—and correct me if I am in error, General—they have asked for $1,750,000 for the next fiscal year to be spent on these surveys and examinations. The general has just told us that if that is the amount appropriated and if in future years amounts about equal to that are appropriated it would take a minimum of 12 years to make the surveys and examinations presently authorized and with reference to which they have already been directed to make.

Senator SYMINGTON. Mr. Chairman, I want to apologize for not being here this morning but I had a hearing of Senator McClellan's committee on the fliers in China and then, as you know, we had the honor of having Mr. Truman coming down to the Hill. I certainly want to come to all these meetings that I possibly can on these very important matters.

Senator KERR. Senator Cotton, do you know General Itschner?

Senator COTTON. Yes, sir; we have met.

Senator KERR. We are now discussing table XV, Senator.

General ITSCHNER. Senator, you asked the question as to the time that the New York-New England resources study and AWR studies would be in Congress. The New York-New England resources study has progressed to the state now where within the next week you will receive an informal advance copy of the complete study, so it is very far along.

The AWR study is not that far along yet.

I will proceed, then, with the special studies.

The study to determine the feasibility of regulating the water levels of the Great Lakes is tentatively scheduled for completion during fiscal year 1957.

A preliminary examination on the San Francisco Bay area was completed in 1953 and a survey was initiated in 1954. This study is tentatively scheduled for completion in fiscal year 1959.

The large backlog of authorized studies has been a matter of considerable concern to the Corps of Engineers. Under current conditions as indicated heretofore, there appears to be little likelihood that this backlog can be eliminated in the foreseeable future.

Accordingly, steps have been taken to streamline and simplify reporting procedures with a view to reducing the cost of the survey program. We plan to prepare brief letter reports on preliminary examinations and surveys on which nothing would be gained by making more detailed studies. Although it is hoped that this action will result in clearing at least 100 reports from the program at a nominal cost, a large program will still remain and the cost will still be high if we are to maintain an acceptable standard of engineering and economic thoroughness.

The rate of progress in accomplishing the authorized investigations is shown on table XVI. If you will refer to that table, you will notice in the column entitled "Backlog" that since 1953 when we had 1,456 reports in the backlog (I should say authorizations, because some

authorizations are combined into a single report) we have reduced that number to 1,390 in fiscal year 1955, and we expect to get it down to 1,285 in fiscal year 1956.

If you will also notice in the column entitled "To Congress," we have been able to step up the rate of production and whereas, in 1953, we had 65 reports which went to Congress, in 1954 it became 107, and in 1955 it became 175, estimated, and we hoped to get to Congress 117 in 1956.

Now, obviously, that rate cannot keep going up as an average because we are concentrating on those reports which are in partial stages of completion to try to get to Congress as many as we can.

Now, that completes the portion of my report, sir, on surveys. Are there any questions that you would like to ask on that phase of it?

Senator KERR. No; I do not believe so, unless Senator Symington has some questions.

Senator SYMINGTON. Mr. Chairman, I would like to ask a question; if it is repetitive and in the record I will look for it and read it. You can correct me, sir, and I will not proceed.

But why, if you have a task to do, General, do you only plan on doing 10 or 15 percent of it every year? Why do you not come up and go ahead and do the whole thing? Is it because of lack of personnel?

General ITSCHNER. No, sir; it is lack of funds. It is entirely lack of funds. We would like to clear away this large backlog and get it down to a reasonable basis, but the funds are insufficient.

Senator SYMINGTON. Is it fair to say that because you have insufficient funds that a lot of the work, when you finally do do it, becomes useless because of obsolescence in the fact that it does not tie in——

General ITSCHNER. There is a certain loss. We have had reports submitted in 1954 which were finally enacted in the 1954 omnibus bill that were originated back 10 and even 15 years before, and the data had become obsolete and had to be changed by special action just prior to submitting the report to Congress. It would be much more efficient to go about these reports in a shorter period of time.

Senator SYMINGTON. Somebody said that this Government is the biggest business in the free world anyway and this administration prides itself in being a business administration, which is fine, but in business you do not peck at things like this. Why do they not come ahead and say, why do you not put down what you want and have it done?

General ITSCHNER. Well, that is a question I am not qualified to answer, sir.

Senator SYMINGTON. May I ask you the question, does the Corps of Engineers submit to the Office of the Secretary of the Army proposals to do the whole job, or is it instructed to submit a proposal to do a small portion of it?

General ITSCHNER. Instructions are not that specific. When we see we get a million or two a year and our total allowance is given to us we have to try to fit it in at a reasonable rate.

Senator SYMINGTON. May I ask one final question, then? I believe you and I have discussed this problem before. It is a different basis. Is it true that you are told that you are going to have so much money to use regardless of what the job is to be done?

General ITSCHNER. Oh, it is not exactly that way, sir.

Senator SYMINGTON. In other words, you are given so much money arbitrarily and from that amount of money you try to do the best you can as against submitting what the task is and figure out what the money is that is involved in it?

General ITSCHNER. We do get an indication of what the amount should be that we should ask for and we do fit our program into that amount.

Senator KERR. You said "indication." Do you get a limited amount of money; a certain standard amount of money?

General ITSCHNER. A bracket.

Senator KERR. From the budget, Department of the Army?

General ITSCHNER. Yes, sir.

Senator KERR. Is that a decision made by the Department of the Army or a decision from the Department of Defense?

General ITSCHNER. I think that as far as the exact amount is concerned, it is worked up by the Department of the Army and the Corps of Engineers together, based upon instructions which are received as to the overall budgetary policy of the United States.

Senator KERR. Received from where?

General ITSCHNER. From the Bureau of the Budget.

Senator KERR. To the Department of Defense?

General ITSCHNER. Yes, sir.

Senator KERR. Or do you work directly with the Bureau of the Budget and bypass the Department of Defense?

General ITSCHNER. We attend meetings with the Bureau of the Budget with the Department of the Army and they tell us what their budget policy is.

For instance, we work directly with Mr. Hughes, the Director of the Budget.

Senator KERR. If the Senators will refer to the calendar of this committee.

Do you have a question, Senator?

Senator COTTON. I just had one question.

Senator KERR. Go ahead.

Senator COTTON. These various surveys, General, where did they originate? Did they originate with the Army engineers or were they the result of desires of certain sections of the country and their Representatives in the Congress to get these surveys?

General ITSCHNER. Yes, sir; we undertake no projects whatsoever that do not come to us—I mean study projects—that do not come to us either by resolution of the Senate Public Works Committee or the House Public Works Committee, or that may be contained in an act of Congress.

Senator COTTON. Now, these surveys that you already have on the trestleboard, so to speak, extend over a vast area that probably contemplate improvements and developments that many of them would not be reached for a long period of years; is that correct.

General ITSCHNER. I am sure that is the case, the funding of them could not be accomplished for many years.

Senator KERR. If the Senator will refer to page 23 there you will see they go back to 1937, they are tabulated.

Senator COTTON. That was just a preliminary to this one question I wanted to ask. If, for instance, you were able to get one big hunk

of money and wash the board and clean it all off and get these surveys done in a year, you, in all probability, would have another avalanche of requests for surveys in various sections of the country which would be more or less stimulated by the fact that this job was completed and the door was open. It that a reasonable assumption?

General ITSCHNER. This is just a matter of my own personal opinion, sir, but I do not think that that would make any real difference in the number of requests for studies. I do think it would make quite a difference in the request for funds to be appropriated to accomplish the construction.

Senator SYMINGTON. Would the Senator yield for a question?

Senator COTTON. I am through.

Senator SYMINGTON. Regardless of the number of requests that were made, the Corps of Engineers at least would have fundamental objections, would not proceed on any surveys they thought were useless; would they?

General ITSCHNER. No, sir; we do not.

Senator SYMINGTON. Thank you.

General ITSCHNER. We defer such reports and have actually recommended that some of them not be undertaken. In other cases we make very brief reports.

Senator KERR. Is it entirely possible that half of the backlog here of resolutions passed on the initiative of the Senators are Senators no longer in the Senate?

General ITSCHNER. I am sure there are many of them.

Senator KERR. There are 28 pages of them, Senator Cotton. Now, this is a tabulation only of the committee resolutions of the Senate and the general has told us that the backlog from this source is about 23 percent of the total backlog.

General ITSCHNER. That is correct, sir.

Senator KERR. The rest of it being the result of similar resolutions by the House committee or general legislation, primarily in the omnibus bill.

General ITSCHNER. Yes, sir.

Senator KERR. If there are no further questions, General, you may proceed.

General ITSCHNER. I would like to next take up a subject which we are asked to consider by the chairman.

Senator KERR. Senator Symington has just called my attention to the fact that the first 30 of this tabulation that he has checked were introduced by Senators no longer here.

Senator SYMINGTON. Twenty-nine out of thirty, Mr. Chairman.

Senator KERR. All right, General.

General ITSCHNER. The next subject in the list of subjects that you asked us to discuss is the question of the backlog of authorized projects.

The large backlog of authorized civil-works projects, some of which have been authorized for a considerable period of time has given much concern to the Corps of Engineers, also, and has been the subject of comment in reports of congressional committees.

Senator KERR. Well now, that is referred to in table I, I believe; is it not?

General ITSCHNER. That is shown in table I; yes sir. However, much of this comment has arisen from lack of understanding of the

program and of the reasons for the growth of the backlog. This growth has been due to the following:

First, the Corps of Engineers acting under the river and harbor and flood-control laws has studied and recommended comprehensive river-basin plans. These plans usually involve large estimated costs and were intended for accomplishment over a period of many years.

Congress has approved or authorized such plans and authorized the appropriation of funds for their initiation and accomplishment.

Second, during the latter years of World War II and in the years following, a large number of projects were authorized by Congress in anticipation of a large Federal public-works program.

Third, appropriations for construction have not kept pace with the rate of authorization.

Fourth, much of the size of the backlog expressed in dollars has been due to the general rise in construction costs which has taken place since the time of authorization.

The backlog itself results in no cost to the Federal Government. Under present procedures for presentation and review of appropriation requests, the Chief of Engineers requests construction funds only for projects that appear meritorious at the time the request is made.

Nevertheless, there has been a general impression that reduction of the backlog would be in the interest of economy.

In addition, the existence of a large backlog of authorized work always gives rise to the question as to why new work should be authorized.

A more serious and valid objection to the existing backlog is the knowledge that it contains many projects which, for various reasons, will never be constructed. These are projects which, because of changes in economical or physical conditions are no longer required or projects in which there is no current local interest, or projects which further studies have shown to be inadequate or undesirable.

The civil works program suffers from inclusion of such inactive projects.

The Corps of Engineers acted in 1953 to propose definite procedures to improve these conditions. This action was taken pursuant to the following instructions:

First, a letter from the Director of the Bureau of the Budget requesting that consideration be given to enactment of legislation providing for deauthorization of projects on April 17, 1953.

Second, a letter of May 1, 1953, from the chairman of the Public Works Committee, House of Representatives, requesting a list of all projects considered to be inactive and possibly appropriate for deauthorization.

And third, another letter dated June 26, 1953, from the Director of the Budget pertaining to draft of legislation in connection with deauthorization and review of projects.

The backlog of projects was analyzed and a classification for each project proposed as active, deferred for further study, or inactive.

The following criteria for inactive classification of a project were established and applied to all projects to determine whether they should remain on the active civil works program.

The first criterion is project definitely lacks economic justification, and it is probable that a current review study would not show economic justification.

Second, the project is not adequate to meet current and prospective needs and will require such substantial modifications and increased costs to obtain an adequate improvement that it should not proceed without additional congressional authority.

Third, local interests are known to oppose a project or have shown no interest in meeting the terms of local cooperation.

Fourth, project or part of the project has been accomplished by local interests or by another agency or has been superseded by another project or recommendation, or for any other reason is no longer required.

Those are the four criteria we used.

In applying these criteria it was found impracticable to classify certain projects definitely as active or inactive on the basis of present cost estimates and available economic studies. Detailed studies to make such classification would require time and funds, which were not available. Consequently, an intermediate category was utilized and designated "Deferred for restudy."

The results of this analysis and a list of the proposed classification of each project were furnished the Public Works Committees of Congress on September 2, 1953. The projects listed in the inactive category were furnished for deauthorization if desired by Congress. A further proposal contemplated that a project in the "inactive" or "deferred for restudy" category would be moved to the "Active" category only upon further study and a showing to the Public Works Committees that a higher category is appropriate, followed by affirmative action of the committees to establish the project in the "Active" category.

One major change in the project classification has just been completed that might be interesting to the committee because of the size and importance of the project.

During the progress of the AWR—that is the Arkansas-White-Red survey—the bulk of the project for navigation and related multiple uses for the Arkansas River has been revised. As a result of that review it is no longer classified as "Deferred for restudy." It will remain in the "Active" category authorized as an approved long-range plan for water resource development in the Arkansas River Basin. This decision, together with certain qualifications regarding initiation of the project, was furnished the Public Works Committees by letters of March 31, 1955.

Senator KERR. I wonder if there is a copy of that here?

General ITSCHNER. I have a copy right here, sir, if you would like to look at it.

The original classification of projects of the civil works program was also furnished to the Bureau of the Budget in 1953 and at the same time it was transmitted to the Congress.

The Bureau of the Budget has taken no action on this matter and it is understood that any action by that agency will be deferred pending completion of studies of the President's Advisory Committee on Water Resources Policy which are now underway.

That completes, sir, my statement on the backlog. I have one or two other statements I would like to make.

Are there any questions on that, sir?

Senator KERR. I would like to have you repeat what you said with reference to your review of the large project for improvement of the Arkansas River for navigation and related multiple purpose development which was approved and initiated by the Congress of the Rivers and Harbors Act of July 1946.

General ITSCHNER. Yes, sir. As a result of a very comprehensive review and the study of that project in the Arkansas-White-Red report, which is now pending, the Arkansas River project of which you speak is no longer classified as "Deferred for restudy." It will remain in the "Active" category authorized as an approved long-range plan for water resources development in the Arkansas River Basin.

Senator KERR. Are there any other questions, Senator Symington?

Senator SYMINGTON. No questions, Mr. Chairman.

Senator KERR. Senator Cotton?

Senator COTTON. I have no questions, Mr. Chairman.

Senator KERR. All right, General.

General ITSCHNER. The next subject then, sir, is the effect of cost changes on the civil works program.

There has been a steady increase in the cost of construction during the two decades since enactment of the first general flood-control act in 1936. The period which has witnessed a very large growth in the civil works program.

In 1935 the Engineering News-Record index which is the accepted measure of general construction cost stood at 196. By 1946 it had risen to 346 and the same index stood at 625 in 1954.

Senator KERR. Is that covered by one of these tables?

General ITSCHNER. No, sir.

Senator SYMINGTON. Senator, may I ask a question there?

Senator KERR. Yes.

Senator SYMINGTON. That is roughly three times as much?

General ITSCHNER. Yes, sir; a 1935 construction dollar was worth 32 cents last year.

Senator SYMINGTON. What is the chief reason for that? Material, labor, or both?

General ITSCHNER. It represents the general price rise of all commodities and types of services in the country, sir.

Senator SYMINGTON. Well, it is considerably more than what they term the devaluation of the dollar which is about 50 percent since that time and you say that this is now down to 32 percent. I was just wondering what the unusual additional expense was.

General ITSCHNER. I do not know why this should be any different from the normal. Of course, some of the components that go into the general price index applicable to all activities contain elements which have not actually increased, gone up, such as electric power and that sort of thing, but this index is prepared as a composite of a very few of the principal construction materials plus common labor.

Senator SYMINGTON. Thank you.

Senator KERR. May I ask there, General, with reference to that statement. As I understood the statement it was giving us the difference in cost of the same material or the same service?

General ITSCHNER. Yes, sir.

Senator KERR. The increase in the amount required to provide a project or a facility is not then the result of a more costly project

but the 33⅓ percent figure you arrived at was due solely to the increased cost of the same facility and material and projects?

General ITSCHNER. That is correct, sir; measured in very simple terms, like so much cement, so much lumber, so much steel, and so much common labor.

Senator KERR. Yes, sir. Do you have a figure showing the increase in benefits generally speaking with reference to those projects?

General ITSCHNER. I was going to come to that, sir. Actually, the increase in benefits also has gone up so that the benefit-cost ratios are not affected very much by any such change, although we analyze them separately, but they remain about constant.

Senator KERR. You mean the relationship remains about constant?

General ITSCHNER. About the same. Yes, sir.

Senator KERR. The increase in the benefits is due in part to the fact that in translating those benefits into present-day dollars that takes most of the difference, probably, and I would presume, at the same time, that due to the expansion of our economy there are other and additional benefits on those projects now than contemplated by your survey of previous years?

General ITSCHNER. Yes, that is true, sir, particularly development in the flood plains, let us say, that are protected by projects.

Senator KERR. I would like to tell Senator Symington and Senator Cotton, one thing brought up by the Chief this morning. The records of the corps have been developed to where the benefits of flood-control projects have been determined and tabulated. The average life of usefulness thus far of the flood-control projects developed by the corps is 11 years.

Experience has proven to the corps on the basis of their records that in that average period of 11 years all of the flood-control projects in the country have returned already a benefit of about 2.56 times the original cost.

The minimum average life of these projects is 50 years. Well, they use the term 50 years because that is the most they want to use in figuring the amortization of the cost, but they told us this morning that the average life would be a minimum of 50 years.

Now, if that is returned 2½ times the cost in 11 years, the indication is that it will return—what did we figure out this morning?

General ITSCHNER. About 10 times, sir.

Senator KERR. At least 10 times the cost in the 50-year life of the project and the average cost ratio of benefits to cost upon which the projects were authorized was about——

General ITSCHNER. Three point four, sir.

Senator KERR. Three point four to one. So, that the experience is proving out that the actual benefits are going to be at least 3 times as much as the original estimate on these projects.

Now, I think the same thing is true with reference to both navigation and power, based on experience. Is it not, General?

General ITSCHNER. I think it is, although in navigation it is sometimes more difficult to get a reasonable figure, especially in the ocean ports. We do not try to get the benefit-cost ratio for ocean ports.

Senator KERR. All right.

General ITSCHNER. To proceed, sir. The reasons for any increases in cost are presented each year to the Bureau of the Budget and the

Appropriations Committees. Due to the current prevalence of favorable bids and to some leveling off in the cost index, our estimates in recent years have increased very little and marked decreases have occurred on some of our projects, particularly the larger ones.

The most serious effect of rising construction costs has been upon the rate of progress. For example, the prewar peak of annual civil-works appropriations was $282 million in 1940, when the engineering news record index stood at 242. In 1954 the appropriation was $443 million, but the index was 625 for that year. Thus, appropriations in dollars did not increase at as fast a rate as construction costs.

Senator KERR. The appropriation in terms of construction secured is actually off 35 percent or more?

General ITSCHNER. That is right, sir—35 percent. I expressed it in just the opposite way but the same result. With a larger current dollar appropriation we cannot accomplish as much work as we did with the smaller 1940 appropriation—about a 65-percent increase. In 1954 appropriations would be required to equal the 1940 program.

Senator SYMINGTON. I would like to ask a question. What was the second year that you used the labor?

General ITSCHNER. We used 1954.

Senator SYMINGTON. 1954. Now, why do you not get enough to do at least as good a job as you could have done before or did do before with the previous money?

General ITSCHNER. Well, that is a question tied in with the overall budgetary consideration, sir, for which we do not know the answer.

Senator SYMINGTON. What do you mean by the overall budgetary consideration?

General ITSCHNER. I mean that the administration, of course, has many problems across the board, ours are just one segment of the overall problem, and the Bureau of the Budget is obliged, of course, to determine how much we should get out of this large appropriation.

Senator SYMINGTON. But, in the theory of business and the theory of risk which is the theory of private enterprise, which is a theory we all believe in, if you can show that you get three times the benefit of the expenditure, you always make the expenditure. I am just wondering what is the curtailment on your Department in money based on the figures that the chairman has just read which presumably he got from your own Chief.

Senator KERR. Well, Senator, I would say that the record and the statements of these witnesses is ample basis for the conclusion that the program as they operate is brought about far more because of directives to them than because of recommendations by them.

Senator SYMINGTON. I thank the chairman for expressing better than I did or could——

Senator KERR. Now, if it is inaccurate, I would like to have the General correct me. I think there was some hesitancy on the part of the General to make that flat statement, but I have made it as my opinion, and if he disagrees with it I would like for him to tell us so.

General ITSCHNER. Well, I think the statement is well expressed, sir.

Senator KERR. Did that——

Senator SYMINGTON. I only wish that I could express myself as consistently as well as the chairman in matters of that character in summing up. He got to the pith of the point that I was attempting to make in very few words.

General ITSCHNER. That concludes my discussion of costs, sir. I have one other subject, the final subject to discuss in accordance with your desires, and that is the public use of reservoir areas and the leasing procedure.

Provision is made in planning constructing, and operating reservoir projects for the conservation, development, the utilization of the natural resources of each project to best serve the public interest. Therefore, the Corps of Engineers coordinates the collateral uses of its projects with the Federal, State, and local agencies having a major interest in these matters.

The construction of large reservoirs has created a huge potential for public recreational use.

I believe General Sturgis this morning mentioned the fact that in 1954 there were 53,800,000 visitor days devoted to sightseeing, picnicking, camping, fishing, boating, hunting, and so on at our reservoirs.

Senator KERR. General, is there any remote comparision between that figure and the one which would give the number of days spent at all other national parks or forests, and so forth?

General ITSCHNER. I can get that from the National Parks, sir, if you would like to have it inserted in the record. I do not have it.

Senator KERR. Do you have an opinion on it?

General ITSCHNER. We think it is somewhat less but not too appreciably less than the National Parks.

Senator KERR. All right.

General ITSCHNER. The Corps of Engineers is administering these projects to provide for development, and utilization of the recreational opportunities created under sound management plans in cooperation with State and local government agencies to the fullest extent practicable and consistent with project authorizations.

Since the people of the States and counties adjacent to a reservoir are the principal recipients of these recreational benefits the auxiliary development of the recreation potential is generally considered to be a responsibility of State and local agencies.

Recreational facilities and services provided by the Corps of Engineers are limited to those necessary in the vicinity of the dam to take care of the visiting public and minimum facilities to make the reservoirs accessible and safe to the general public for recreational uses.

The Corps of Engineers, in providing for wildlife conservation at its projects, proceeds in accordance with specific Federal and State laws recognizing the responsibility of the Federal wildlife agency for carrying out national and wildlife programs and the responsibility of the State wildlife agencies for management of all wildlife within their respective borders.

By that I mean the national interest is in the flyways for ducks and such as that.

Land acquired for corps projects is administered in accordance with a master plan prepared as a guide for development and utilization under which the lands are allocated to the highest and best collateral use in the public interest.

Development and use of these lands is accomplished under licenses, leases, permits, and easements granted on a competitive basis when appropriate or otherwise at a fair rental value for terms ranging from temporary grants of 1 year up to 50 years for long-term uses.

Fourteen thousand grants covering use of civil-works projects of the corps were in effect during 1954, which provided a monetary return of $2 million.

Senator KERR. Now, that is leasing of ground for some purpose?

General ITSCHNER. For some purpose and many purposes.

In accordance with section 206 of the Flood Control Act of 1954, 75 percent of these funds derived from leasing, lands acquired for navigation and flood-control projects are returned to the State for the benefit of public schools and public roads of the counties concerned or for defraying any expenses of county government of such counties.

In accordance with section 4, the Flood Control Act of 1944, and amendments thereto, reservoir lands have been made available without charge to State, county, and municipal governments under licenses for terms of 25 years for public park and recreational development.

Similar long-term leases are granted to nonprofit organizations such as the Boy Scouts at reduced or nominal rentals in recognition of the public service to be rendered in their use and development of the area.

Under such leases, approximately 140 organized summer camps are being operated by character-building agencies. Over 800 leases and licenses have been granted for use of reservoirs for some form of recreational development.

Lands allocated in the master plan for agricultural use are maintained in a productive state by leasing for agricultural purposes in accordance with the act of Congress approved August 5, 1947.

Senator KERR. In that regard, General, is there any preference given to the former owners in connection with those leases?

General ITSCHNER. Yes, sir; there is. They are given preference. If they desire to lease what was formerly their own property they have first choice. It is only leased to others when they do not lease it.

Senator KERR. When the former owners do not want it?

General ITSCHNER. That is right, sir.

Senator KERR. Off the record.

(Discussion off the record.)

Senator KERR. Is there anything further, General?

General ITSCHNER. I have finished my statement, sir.

Senator KERR. I want to say to you what I have said to the Chief this morning: We are tremendously grateful to you for this information, for the knowledge that is included in the statement that you have made.

Are there any questions, Senator Cotton?

Senator COTTON. No, sir, Mr. Chairman.

Senator KERR. Senator Symington?

Senator SYMINGTON. No question, Mr. Chairman.

Senator KERR. Subject to the probability that we will come back to some of these questions, we will now consider the bills that were set down for hearing today.

In order that the Senators may know about them, there are three of them. One is S. 15 and its companion bill S. 1340, introduced by Senators Johnson and Daniel. It has to do with the reconveyance of certain lands on the Brazos and Padre Islands, in Cameron County, Tex., including accretions thereto, to certain communities down there who have been using it for certain purposes and who want to acquire title to it in order that they may have that kind of a title that will enable them to do some financing through the issuance of bonds.

We have also S. 1069, which would increase the authorization for the Columbia River project at Bonneville from $50,000 to $185,000 to take care of acquiring land and replacing fishing facilities previously enjoyed by certain Indian tribes.

With reference to that Senator Neuberger wants to bring up a proposal to have the same principle apply to the Dalles Dam where a similar problem exists.

The other is S. 1070 which is to amend the existing law concerning emergency flood-control work, to provide greater authority and increased funds for emergency flood preparation, and to eliminate present requirements in the law of maintaining flood control works which are threatened or destroyed by flood.

With reference to S. 15 and S. 1340 I would like to read a statement by Senator Lyndon Johnson:

Mr. Chairman and members of the committee, I sincerely appreciate this opportunity to present a brief statement in support of the bill currently before you, which was introduced by me and my colleague, Senator Daniel.

The bill authorizes and directs the Secretary of the Army to reconvey certain lands on Brazos and Padre Islands, Cameron County, Tex., to the Brownsville Navigation District. These lands were originally purchased by the navigation district and conveyed to the United States in 1932 when it was believed that the Federal Government would have need for them in connection with a harbor project then underway. The land in question is now and has been for some time surplus to the needs of the Federal Government, and since the local area has spent considerable sums of money converting the properties into recreational facilities, it is felt both desirable and necessary that they be reconveyed at this time.

The bill provides that the navigation district will pay the same price for the lands that the United States paid.

In addition to the recreational facilities, Cameron County has spent $2,750,000 erecting a causeway connecting Padre Island with the mainland. S. 1340 provides a permanent easement over the causeway for the Federal Government and its employees. In addition, all mineral rights to fissionable materials are reserved to the United States.

Reconveyance to the navigation district is extremely important at this time to facilitate financing arrangements contemplated in connection with further development of park and recreational facilities by the local authorities. Since some of the land is neither suitable nor intended to be used for park purposes, but will continue to serve in connection with the harbor activities, it would largely defeat the purposes of this legislation if the bill contained a clause limiting the use of the land to park and recreational purposes.

The general procedure proposed in the bill is that commonly followed in similar cases. I will deeply appreciate this committee's prompt and favorable consideration of the bill and I thank you again for your courtesy in giving me this opportunity to be heard.

The Secretary of the Army under date of April 1, 1955, has written with reference to this legislation:

Reference is made to your request for the views of the Department of the Army with respect to S. 1340, 84th Congress, a bill to authorize the conveyance by quitclaim deed of certain land to the Brownsville Navigation District of Cameron County, Tex

The Department of the Army has considered the above-mentioned bill and has no objection to its enactment, but recommends that it be amended as suggested in this report

What is the amendment they are recommending?

Are you familiar with that, General?

General ITSCHNER. I am, sir. Mr. Pearl is here.

Senator KERR. Mr. Pearl, will you give us the benefit of that?

Mr. PEARL. The Department recommends the amendment of the bill to provide that the property, upon reconveyance, be used for

public park and recreational purposes, and that in the event it is not so used for 2 successive years that the property or title to the property should revert to the Federal Government.

Senator KERR. That was just about, as I understand it, what would have been done under S. 15, as originally introduced. But the Senator from Texas advises: (1) that a part of the land is not suitable for that use and therefore that requirement could not be met; (2) unless they have absolute title to it they cannot issue bonds against it. And that was the reason they introduced S. 1340, which is S. 15 amended, and the amendment which they introduced last eliminates the requirement that if the property ceases to be used for park purposes title will revert to the United States.

The county felt that such provision would reduce the salability of their bonds. What is the basis of the Army's recommendation that that provision be put in?

Mr. PEARL. That has been more or less the standard procedure that we have operated under, Mr. Chairman. Of course we have no particular opinion on the matter other than that as a matter of public policy these lands, as General Itschner pointed out before, have been made available for public park purposes when they were not required actively for the project. These particular lands were under lease to the Cameron County park people for 5 years up until last year, and the lease on Padre Island has been renewed for a new 5-year period.

The lands in question having been under lease to the County for park purposes we think that it would only be consistent to spell out the purpose for which the lands are being conveyed, in this manner, through special legislation.

Senator KERR. What is the record with reference to how much the Government paid for these lands?

Mr. PEARL. Going mack to the project itself, in the act of 1930 a channel improvement project was authorized and it was a local cooperation project. As part of the local cooperation the Brownsville Navigation District acquired these lands from private interests and transferred them to the United States without charge.

Senator KERR. That is, without the United States paying them in money for it. But that transfer was either all or a part of the local participation provided for in the authorization?

Mr. PEARL. Yes, sir.

Senator KERR. So that while Congress paid them no money for the actual title to the land, Congress did spend the money, other than cost of acquisition for the land, for the development of the project and therefore actually the Federal Government does have an investment in terms of dollars and cents in this land?

Mr. PEARL. Yes, sir.

Senator KERR. That would be your conclusion?

Mr. PEARL. Yes, sir. The bill provides for the retention of certain small areas as required for future maintenance of the jetties. Those are the areas crosshatched in green on that map, the parcels that would be retained. There are in addition to that some hopper dredge ranges and survey monuments in the areas that would be transferred to the Brownsville Navigation District.

Senator KERR. As I understand it this is Padre Island here?

Mr. PEARL. Yes, sir.

Senator KERR. This is Brazos Island here? The proposal would be to reconvey all of this and all of this, with the exception of this colored area here and this colored area here [Indicating].

Mr. PEARL. That is correct, sir.

Senator KERR. The Army approves the proposal except it recommends that the reconveyance have a conditional provision in it that in the event it is not used for the purposes for which it is reconveyed that it will then again revert to the Government?

Mr. PEARL. Yes, sir.

Senator KERR. Do you have any further recommendations?

Mr. PEARL. No, sir.

Senator KERR. Are there any questions?

Senator COTTON. Yes, Mr. Chairman.

I noticed in one of the communications you read—it may have been from Senator Johnson—it was stated that a certain part of this land was unsuitable for park and recreational purposes and would have to be used for general harbor purposes, I think the phrase was. What does that mean? That some part of this would be used for docks, wharves, or something of that kind?

Mr. PEARL. I do not know, because the information that we have is that the highest and best use of the property would be for public park purposes and recreational purposes, to which it has been devoted in the last 5 years. On Padre Island the mainland is accessible to the island by the causeway mentioned in Senator Johnson's communication and is directly accessible for the people to come across.

Senator COTTON. I gathered from the statement that the bill in the present form, S. 1340, its proponents actually contemplated that a certain portion of that land, if acquired by the local group, would be used for purposes other than park and recreational, and that of course would be entirely countermanded if the recommendation of the Army were adopted.

Mr. PEARL. Yes, sir. But we have not, prior to this day, had any indication that it was intended to use any part of the property for anything but park and recreational purposes.

Senator COTTON. Thank you.

Senator KERR. Here is what the Senator says:

> Since some of the land is neither suitable nor intended to be used for park purposes, but will continue to serve in connection with the harbor activities, it would largely defeat the purposes of this legislation if the bill contained a clause limiting the use of the land to park and recreational purposes.

I take it that what you are saying to us is that you do not recommend it unless it has the definite provision in it that if it is not used for park and recreational purposes in part or in toto, and then with reference to that part which is not, it would after 2 years revert to the Federal Government?

Mr. PEARL. That is the Department's position.

Senator KERR. What the Corps is telling us is that they would approve S. 15 but they would not approve S. 1340. It appears that the letter from the Bureau of the Budget relates to S. 15. Have we asked for the report of the Bureau of the Budget on S. 1340? We have asked for it and not received it, as I recall.

This letter from the Army is consistent with what Mr. Pearl has told us, is it not, Mr. Sneed?

Mr. SNEED. Yes, sir.

Senator KERR. We will have the letter from the Army inserted in the record.

(The letter is as follows:)

April 1, 1955.

Hon. DENNIS CHAVEZ,
Chairman, Committee on Public Works,
United States Senate,

DEAR MR. CHAIRMAN: Reference is made to your request for the views of the Department of the Army with respect to S. 1340, 84th Congress, a bill "To authorize the conveyance by quitclaim deed of certain land to the Brownsville Navigation District of Cameron County, Tex."

The Department of the Army has considered the above-mentioned bill and has no objection to its enactment, but recommends that it be amended as suggested in this report.

The purpose of this measure is to authorize the Secretary of the Army to reconvey by quitclaim deed to the Brownsville Navigation District those lands on Brazos and Padre Islands, Cameron County, Tex., including accretions thereto, which were conveyed to the United States by the district by two deeds, both dated 25 October 1932, except for such portions of the land or interests therein as the Secretary of the Army may determine are needed in connection with river and harbor improvement works at this location. The conveyance is to be made for a monetary consideration equal to that paid by the United States to the Brownsville Navigation District. The United States Coast Guard occupies an area of about 10 acres contiguous with the lands on Padre Island proposed to be reconveyed and the bill provides that the deed of conveyance will contain such terms and conditions as the Secretary of the Treasury considers necessary to assure that the use of the land will be compatible with the operation of the United States Coast Guard. The bill further provides for the reservation by the United States of all right, title, and interest of the United States in source material (as defined in the Atomic Energy Act of 1954), and that the reconveyance will contain assurances that the United States Government shall have the right to use without charge the existing causeway constructed by Cameron County, Tex., for access to Padre Island, in connection with governmental activities.

The act of Congress approved July 3, 1930 (46 Stat. 926) which authorized certain channel improvements at Brazos Island Harbor, Tex., contained a proviso that land requirements for the project should be satisfied without Federal expense. Accordingly, the Brownsville Navigation District purchased the land required for the construction of jetties, for the establishment of dredging ranges, and survey markers, and conveyed it without cost to the United States by two deeds dated October 25, 1932, one conveying approximately 213 acres on Brazos Island and the other conveying approximately 149 acres on Padre Island.

Upon completion of the harbor work, the land acquired from the navigation district was leased to Cameron County, Tex., for a term commencing August 1, 1949, and ending July 31, 1954, for a consideration of $70.68 per annum, the land to be used for public park and recreational purposes. Upon expiration of the lease, a new lease providing for the use of the land on Padre Island only was entered into for a term commencing August 1, 1954, and ending July 31, 1959. During the 5-year lease term, the county constructed various public-park and recreational facilities and a causeway costing $2,750,000 which connects Padre Island with the mainland. The county has plans for further development of the land for park and recreational purposes, the improvements to be financed through the issuance of revenue bonds. The county considers that ownership of the park area is essential to its plan for financing the proposed development. It is understood that if the conveyance which S. 1340 would authorize is made, the Brownsville Navigation District will convey the land to Cameron County in consideration of the payment by the county to the district of the sum which the district expended in acquiring the land for the United States.

Since the property has been developed by the county for park purposes and such further utilization is contemplated, it is considered advisable that the purpose of the bill be clearly shown therein. To effectuate this, it is suggested that at line 7, page 1 of the bill, after the word "therefor", there be added "for public park and recreational purposes,". It is further suggested that a new section be added as follows:

"In the event said property shall cease to be used for public park and recreational purposes for a period of 2 successive years, then title thereto shall immediately revert to the United States."

While most of this land has served the primary purpose for which it was acquired, if the conveyance is authorized, it will be necessary to retain title to certain small areas for maintenance and repair of existing facilities and for construction of possible future extensions thereto. The United States Coast Guard lifesaving station on adjoining land at Padre Island may require certain reservations and restrictions in the deed to protect it. In addition, Government contractors will, from time to time, use the county causeway in connection with performing maintenance work on the existing jetties. This use of the causeway, without charge, as provided in the bill, will result in some savings to the Government. Sufficient latitude is provided by the present language of the bill to limit the conveyance as outlined and to include such additional restrictions as project operations or the public interest may require.

Enactment of S. 1340 will not involve the expenditure of any Federal funds.

The Bureau of the Budget advised that there was no objection to the submission of a similar report on H. R. 3675, 84th Congress, a companion bill.

Sincerely yours,

(Signed) CHARLES C. FINUCANE,
Acting Secretary of the Army.

Senator KERR. I do not believe at this time we will insert the letter from the Bureau of the Budget in the record. We will await receipt of the letter from them with reference to S. 1340.

(The referenced letter from the Bureau of the Budget follows:)

EXECUTIVE OFFICE OF THE PRESIDENT,
BUREAU OF THE BUDGET,
Washington, D. C., May 5, 1955.

Hon. DENNIS CHAVEZ,
Chairman, Committee on Public Works, United States Senate,
Washington, D. C.

MY DEAR MR. CHAIRMAN: This will acknowledge your request of March 9, 1955, inviting the Bureau of the Budget to comment on S. 1340, "To authorize the conveyance by quitclaim deed of certain land to the Brownsville Navigation District of Cameron County, Tex."

In a report to you, dated April 1, 1955, the Secretary of the Army has recommended minor perfecting amendments to S. 1340. The Bureau of the Budget concurs in the views expressed in that report and would have no objection to enactment of the bill, if so amended.

Sincerely yours,

DONALD R. BELCHER, *Assistant Director.*

Are there any questions about this bill? If not, we will go to S. 1069.

General ITSCHNER. I would like to have Mr. Brennan testify with reference to S. 1069.

Senator KERR. I wish he would explain the bill and then give us his viewpoints.

Mr. BRENNAN. Mr. Chairman, S. 1069 is a bill to increase existing monetary authorization which would permit the Corps of Engineers to provide fishing sites for certain Indian tribes located along the lower Columbia River in the Bonneville Dam pool. The original authority was contained in the River and Harbor Act of 1945 and provided that a sum not in excess of $50,000 be authorized for appropriation to provide these replacement facilities.

There was considerable discussion among the Indian tribes and between the Corps of Engineers and the Indians regarding the suitability of the sites that were being considered. There was not complete agreement on them. That extended over a period of some years. At the present time we have acquired 2 sites: 2 more are under condemnation, and the final 2 have to be replaced by substitutes, because they no longer are suitable.

Senator KERR. Wait just a minute.

What that means is that in lieu of 2 previously acquired you are going to have to acquire 2 additional which will be a part of the total of 6, which it is the desire of the engineers to acquire and which, as I understand it, you are telling us when acquired will meet first the standards that you have set up of being adequate compensation for that which was taken away from them, and second, that when the 6 are acquired and provided and furnished to the Indians that they will be satisfied to accept them in lieu of what they gave to you?

Mr. BRENNAN. That is correct, Mr. Chairman.

The cost of acquiring these sites and providing the minimum facilities has increased due to the general rise in construction prices and due to the increased cost of the land.

Senator KERR. Is a part of this $185,000 to be spent for land?

Mr. BRENNAN. Yes, sir. A part of that $185,000 is for land. A large part of it, sir, however, is for the minimum facilities, which include clearing, grading, access roads, sanitary facilities, water supply.

Senator KERR. How does it happen that agreement was not reached with these people prior to the building of the project?

Mr. BRENNAN. The project, sir, was actually authorized under an emergency relief act back in 1933. Construction was finished in the late 1930's. The provision in law which would permit us to acquire and replace these sites was not made until the 1945 act.

Senator KERR. Was the relief program in 1933?

Mr. BRENNAN. Yes, sir.

Senator KERR. Was that one which directed you to take land or use land or put projects on land without acquiring title to the land?

Mr. BRENNAN. No, sir. We acquired title to the land, but the Indians have been granted, by a treaty in 1855, a right to fish in that section of the river. What was desired was a replacement of other fishing sites.

Senator KERR. The thing that I do not understand is how it was that that was not met at the time?

Mr. BRENNAN. You mean in 1933?

Senator KERR. Whenever they were disposed of what they had. The thing I cannot understand is this: Does not the corps ordinarily pay people for land?

Mr. BRENNAN. Yes, sir, the corps does, as is required, as are all Government agencies in condemnation proceedings, to pay for the land. This was not a simple matter of land condemnation with a payment. It was to replace the facilities which would permit them to continue to secure fish.

Senator KERR. In other words, there was an agreement made that their facilities would be replaced?

Mr. BRENNAN. That is correct.

Senator KERR. It was thought at the time that $50,000 would cover that?

Mr. BRENNAN. That is correct.

Senator KERR. And on the basis of that the Congress authorized that amount?

Mr. BRENNAN. That is correct.

Senator KERR. In carrying out that program and meeting the obligations of the requirement you find that that will not meet the cost

of doing that which in effect you agreed to do, and that which your judgment and concept is that justice requires you to do?

Mr. BRENNAN. That is correct, Mr. Chairman.

Senator KERR. And therefore you recommend the authorization at $185,000?

Mr. BRENNAN. Yes, sir.

Senator KERR. Are there any questions?

Senator COTTON. No, sir.

Senator NEUBERGER. I would like to call attention to a couple of things. This is exclusive of your situation at The Dalles; is it not?

General ITSCHNER. That is correct.

Senator NEUBERGER. Which is much more serious as regards the fishing rights?

General ITSCHNER. Yes, a great deal more serious.

Senator NEUBERGER. Their main fishing grounds in the Columbia River are the ones that will soon be drowned out behind the Dalles Dam. The fishing grounds involved at Bonneville are relatively minor so far as a portion of the catch is concerned. Is that right?

General ITSCHNER. That is right.

Senator NEUBERGER. The Dalles Dam was begun without completing the agreement with the Yakimas; was it not?

General ITSCHNER. Without completing agreement with any of the tribes.

Senator NEUBERGER. I knew the Yakimas had been the ones that had sustained it longest. But without the Warm Springs or others.

General ITSCHNER. Yes, or the Umatillas, or Nez Perce.

Senator NEUBERGER. I want to make clear to the chairman a much more serious situation than regarding the fishing rights of the Indians on the Columbia, and its replacement, is involved in the Dalles Dam.

Senator KERR. In order that I may understand it: The requirements for funds for the Dalles project are not included in this bill?

Senator NEUBERGER. No, they are not.

Senator KERR. Is there a bill to do that before the committee?

General ITSCHNER. There is not, sir. The cost of paying the Indians for their fishing rights at the Dalles Dam is included in the regular appropriations for the Dalles Dam.

Senator NEUBERGER. $23,700,000. Is that correct?

General ITSCHNER. That was correct at one time; our most recent estimate is $26,819,000.

Senator NEUBERGER. That is in the form of an indemnity; is that correct?

General ITSCHNER. Yes, sir.

Senator NEUBERGER. To reimburse them in toto for——

Senator KERR. In what bill is that provided?

Senator NEUBERGER. In the general appropriation for the Dalles project on the Columbia River.

Senator KERR. Is that in the appropriation or general authorization?

General ITSCHNER. It is in the authorization bill and the appropriation bills have carried an item specifically indicating that some of the funds are available for paying the Indians for their fishing rights.

Senator KERR. It is not contemplated it will take $26,800,000 to pay these few families of Indians; is it?

General ITSCHNER. We are paying something in the order of a little over $26,800,000 to the 5 tribes of Indians who fish at Celilo Falls, which is in the pool of the Dalles Dam, and the falls will be drowned out by that project.

Senator NEUBERGER. Mr. Chairman, let me point out for the benefit of the committee what is involved at The Dalles. Celilo Falls has been the principal Indian fishing ground on the Columbia River I guess since before the first white man came. As I have understood, about 95 percent of the Indian catch has been taken at Celilo Falls, which is the most propitious place for taking the salmon as they leap this relatively low barrier.

They used to catch them by spears. Now they do it with nets. The Dalles Dam will completely inundate that feature of the river. It will no longer exist at all. There have been a good many Indian families, running into five or six hundred families, that have been completely dependent for their year-round income upon what they can catch at this particular place.

They had a treaty right going back to 1855, I believe, approved by President Buchanan, giving them the right to fish there in perpetuity. The $26,800,000 is to reimburse them for the total loss of that fishing site.

Is that correct, General?

General ITSCHNER. That is correct.

Senator NEUBERGER. There also is involved the question of alternative dwellings at the new sites to be created. Is that not a situation that the engineers are confronted with in the future budgeting?

General ITSCHNER. Yes. That is in connection with the relocation of the railroad and the highway because we have to relocate those two arteries of traffic through property actually occupied by Indian dwellings of a very low type. So we do have to relocate those Indians and provide substitute housing accommodations for them.

Senator KERR. That is a different matter entirely, either from S. 1069 or from the $26,800,000 payment for the taking of the fishing rights at Celilo Falls?

General ITSCHNER. It is a completely different problem.

Senator KERR. What did you have in mind, Senator?

Senator NEUBERGER. I just wanted to bring out for the committee, so that when the Corps of Engineers does come back—and I want to get from General Itschner and I hope I can—the fact that they do feel some responsibility for these dwellings of the Indians, so that they will include it in future requests.

General ITSCHNER. We do feel responsibility for relocating these Indians in proper housing conditions. However, we feel that if we must go in there, as desired by the Indian Service, and relocate them in buildings above the standard that they now occupy in buildings built by the Indian Service, which incidentally is greatly above the standard of the buildings that they are now living in on the right-of-way, that will require some special authorizations. So there may be a bill sometime for that purpose.

If we could relocate them in minimum facilities alongside, let's say, the present development there by the Indian Service, we think we have adequate authority to cover that.

Senator KERR. The Senator did not have in mind to offer an amendment to S. 1069?

Senator NEUBERGER. No, Mr. Chairman. I just felt that while the situations are separate, they are parallel. I wanted to bring out for the committee that there will be these future requests involving the Dalles Dam which is much more serious by many, many times in its impact on fishing than Bonneville ever was.

Senator KERR. As I understand it, the theme to which you address yourself is that it applies to certain Indian families now living in the areas to be affected and taken, actually, in the relocation of highways and railroads?

Senator NEUBERGER. That is right.

Senator KERR. And it is separate and apart from the problem of either paying them for the fishing rights they have lost or a project such as contemplated in S. 1069 which, as I understand it, is replacing fishing places rather than either reimbursing for those which are not to be replaced or removal of families from areas to be directly affected by improvements?

Senator NEUBERGER. That is, in my assumption, correct.

General ITSCHNER. That is correct.

Senator KERR. Is there anything further, Senator?

Senator NEUBERGER. No, sir.

Senator KERR. Is there anything further on this S. 1069?

General ITSCHNER. No, sir.

May I go off the record for a minute?

Senator KERR. Yes.

(Discussion off the record.)

Senator KERR. On the record.

Senator NEUBERGER. I went over this with some of the Oregon fish people, who I believe were called in as technical advisers by Colonel Lipscomb, your engineer. The Army engineers obviously are not ichthyologists or experts on commercial fishing. It is my understanding, Senator Cotton, that in some years the Indians have caught as much as $700,000 worth of fish. So you can see that if there were very many years like that—and this involves the complete obliteration of that site and the loss of the complete opportunity for ever again having that type of catch, because there is no other place on the Columbia River where they can go and have that much access to these migrating fish as they had there at the falls.

They do not have fish traps, they do not have fish wheels, they do not troll offshore like the white commercial fishermen. So this in effect is just like taking a fishing boat away from another man who does his fishing. They have lost their opportunity for that. It has been their sole livelihood.

Senator KERR. For generations.

Senator NEUBERGER. Lewis and Clark describe it in their journals, and they were the first white men to come down the Columbia River. They describe the Indians at that fishery, and a large cannery known as Seuffert's Cannery existed at The Dalles largely purchasing these fish from the Indians. So it has been a large source of income to them, Senator Cotton. It is not a minor matter.

Senator COTTON. I asked the question off the record because I had no conception of the situation. I was in no way belittling their privileges. But what is going to happen to these Indians, even if you give them $26,800,000?

Senator KERR. That is a pertinent question My judgment is that what they had cannot be replaced with $26,800,000.

Senator COTTON. They will spend the $26,800,000 and there they are. Is there any plan for them?

Senator NEUBERGER. The hope exists—and I cannot comment on this as authoritatively—I have not gone beyond finding out what their problem is—the hope exists that this money, instead of being divided up so each one of them will have a new car or something, that it can perhaps be used for some cooperative ventures or something; whether it is in the woodworking industry or something like that, so that they can move into something else rather than just have it divided.

General ITSCHNER. That is the plan. For instance, they plan to construct a lumber mill and so on, to try to give them a perpetual source of income rather than have the money spent.

Senator COTTON. Do not put them into textiles. New England is hard hit.

Senator KERR. Do we have a letter from the Bureau of the Budget on S. 1069? I would like to have put into the record the letter from the Army.

(The letter referred to above is as follows:)

FEBRUARY 1, 1955.

Hon. RICHARD M. NIXON,
President of the Senate.

DEAR MR. PRESIDENT: There is forwarded herewith a draft of legislation to amend section 2 of the act of March 2, 1945, pertaining to the Columbia River at Bonneville, Oreg.

The submission of this legislation is in accordance with procedures approved by the Secretary of Defense. The Bureau of the Budget has advised that it has no objection to the submission of this proposal for the consideration of the Congress and the Department of the Army recommends its enactment.

The purpose of this proposed legislation is to increase the authorization for acquiring land and providing facilities to replace Indian fishing grounds submerged or destroyed as a result of the construction of the Bonneville Dam, Columbia River, from $50,00 to $185,000.

Pursuant to the authority in section 2 of the River and Harbor Act of March 2, 1945 (59 Stat. 10), negotiations were undertaken with the Yakima, Umatilla, and Warm Springs Indian Tribes as to the selection and improvement of agreed sites. Considerable controversy arose among the Indians as to the sites. This controversy was settled after several years by the Indian tribes appointing the Celilo Fish Committee to act for all the tribes. It has been agreed that six sites will be provided. They will be acquired by the Government and improved by clearing and grading, providing access roads, installation of railroad crossing with signals where necessary, construction of incinerators, drying sheds for curing salmon, and construction of water supply and sanitary facilities. Title to the sites will be conveyed to the Department of the Interior for the use of the Indian tribes. Two sites have been acquired by direct purchase and limited facilities constructed. Two other sites are being acquired through condemnation. The last two sites which were orginally agreed upon can no longer be utilized because of changed conditions subsequent to their selection. Substitutes for these two sites are now being sought. Land for this specific use is limited in the Bonneville pool. The alternate sites considered suitable will require expenditure of considerable funds for access roads, clearing and grading, and filling of a portion of the land in order to convert it to beneficial use.

In addition to this factor, which will increase the cost, land costs have also risen sharply in this area and construction costs have risen in general as they have in other parts of the country. It is now estimated that an additional sum of $135,000 will be needed to fulfill the Government's obligation in replacement of Indian fishing grounds submerged or destroyed as the result of the construction of the Bonneville Dam. The total cost will therefore be $185,000. The foregoing amendment is required to obtain the additional authorization.

Sincerely yours,

ROBERT T. STEVENS,
Secretary of the Army.

A BILL To amend section 2 of the act of March 2, 1945, pertaining to the Columbia River at Bonneville, Oregon

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That section 2 of the River and Harbor Act approved March 2, 1945, pertaining to the Columbia River at Bonneville, Oreg., is hereby amended by striking out the amount "$50,000" and substituting in lieu thereof "$185,000."

Senator KERR. Are there further questions on S. 1069?

Senator NEUBERGER. I would like to ask a question or two, if I may, Senator Kerr. I appreciate your courtesy.

I have one just very briefly, and actually one that is on a relatively small matter in terms of the great national budget, which has become a great moral issue in my State.

The Dalles Dam, of course, is a navigation project. Is that not the authorization for it, and is it not regarded as a navigation project?

General ITSCHNER. It is a navigation project; yes, sir.

Senator NEUBERGER. It is one of those listed under the navigation. This is what so many people in my State have written me about—I have a whole file of letters on it—are you folks in the Army engineers or is the Department of the Interior providing funds for relocating the Indians at their fishing grounds?

Senator KERR. Off the record.

(Thereupon, there was a discussion off the record.)

Senator NEUBERGER. General Itschner, did you say you could answer?

General ITSCHNER. In that connection we are going to have to pay the cost of relocating those Indians who will be displaced.

Senator NEUBERGER. Will that be included in your budget? Are you making recommendation for that?

It was done that way in the Missouri River one.

General ITSCHNER. Yes, but only for those who will be displaced by the Union Pacific Railroad relocation.

Senator NEUBERGER. That has concerned the people of my State greatly because they do have those treaty rights that go back to 1855, and there is feeling on the part of many of the people that there is an obligation on the part of the Government to provide housing for those Indians. You will do that, as I understand your answer, is that correct?

General ITSCHNER. Yes, we have funds now. The only question is to what degree and to what extent do we relocate them, to what standards are we going to construct the housing.

Senator NEUBERGER. Just one more question. Some will obviously be displaced this year by the Union Pacific relocation, will they not?

General ITSCHNER. We will have to displace them very soon; yes, sir.

Senator NEUBERGER. That is what I wanted to know, Mr. Chairman, because, as I said before, many people in my State feel that there is a strong moral obligation on the part of the Government to provide proper and adequate housing for the Indians who will be flooded out of the Celilo Falls fishing grounds by the Dalles Dam.

These Indians, after all, can point to solemn treaty obligations with the United States, which go back a century in time. A treaty with an Indian nation is no less important than a pact with England, France, Thailand, or some other sovereign country.

That is what I wanted to find out, Mr. Chairman. Thank you very much.

Senator KERR. As I understand S. 1070, it does 2 things: First, it authorizes $15 million instead of the amount previously authorized for a year, in the amount of $10 million, to meet the needs of the corps with reference to emergency flood problems. Second, the bill, in addition to an authorization for money, has a provision which would relieve you of the requirement that you now have to maintain certain flood-control projects so as to avoid the creation of emergency flood situations.

General ITSCHNER. Mr. Chairman, I would like to ask Colonel Starbird to handle this testimony.

Senator KERR. That is fine. I would be glad to hear him.

Is that generally what the bill does?

Colonel STARBIRD. It is a little bit different from that, sir. It is rather complex because there have been several modifications and amendments. I will just start with the original act and then the last act, and explain how the last act would be changed by S. 1070.

The original act of 1941, section 5 specifically of the 1941 Flood Act, established authority for an emergency fund. Back in those days it was only a million dollars. An emergency fund to be used for flood rescue and for the repair and rehabilitation and maintenance of flood-control work. It was an emergency authority, in other words, to do flood fighting.

That has been modified several times, Mr. Chairman, since. The last modification was by the act of 1950. Section 210 of the 1950 Flood Control Act finally raised the amount of the authorized fund to $15 million, the same as covered in this present act. It did not change the language as to what we could do with that.

Senator KERR. It did not change your responsibility with reference to certain maintenance obligations.

Colonel STARBIRD. It did not; that is correct, sir.

Senator KERR. Did Congress, in providing the $15 million, indicate that they thought that would be an amount sufficient to enable you to meet the requirements placed upon you by legislation including that of certain maintenance features?

Colonel STARBIRD. The amount of $15 million, and the lesser amounts earlier, were to be replenished periodically as necessary. There was authority actually in the language for annual replenishment if this was needed. Basically, I believe, to go back to the time of the original act, the 1940 and 1941 period, there was the thought that we should have very, very broad authority and be able to do about as was necessary to fight the flood.

To be consistent with the basic policies that we apply with respect to construction of flood-control structures, we have not been maintaining structures with this emergency fund. We have been using it instead to conduct rescue operations and to repair and rehabilitate damaged structures.

To answer one of your points, sir——

Senator KERR. That is, you actually have not been using it for repair of deterioration from ordinary wear and tear. You have been actually following the policy of limiting the use of it to meeting emergencies caused by floods?

Colonel STARBIRD. You are exactly right, sir. We would repair where the flood caused the damage but not where fair wear and tear, normal maintenance, should have taken care of that damage and retained the structures in good shape.

So the modification of language that you have would do, first, one thing: Eliminate this wording of maintenance which comes up periodically with us, where individuals who have not maintained the structures to a normal and reasonable standard point to the law and say the law would permit the Government to do that maintenance.

Senator KERR. In other words, administratively to do the job, due to the lack of funds actually the practice has been about what would be contemplated by the language in this act?

Colonel STARBIRD. That is correct, sir, for the item you have brought up. There is one other item I would like to mention in connection with a change in language, but one that reflects what we have been doing. That change is to add to the language the words "emergency preparation." In other words, that is preparation ahead of time to handle an emergency situation that may arise.

Senator KERR. You mean preparation ahead of time to avoid excessive damage created by excessive floods?

Colonel STARBIRD. That is correct, sir.

Senator KERR. In other words, on the basis that a pound of cure is just as important as a given amount of repair?

Colonel STARBIRD. You are correct, sir.

Senator KERR. You say that since 1950 the authorization has been $15 million, and it has been in practice for a revolving authorization, and when that which was given at any certain year was exhausted it would be built back by new authorizations of $15 million. There is no change in it in that regard.

Colonel STARBIRD. There is no change in it in that regard. The Secretary of the Army has recommended enactment of the revised language, and the Bureau of the Budget has stated no objection to the enactment.

Senator KERR. In other words, it has in effect been approved by the Department of the Army. Did they speak for the Bureau of the Budget also? In view of the fact that this legislation was proposed by the Army, before they did that they got the approval and permission of the Bureau of the Budget?

Colonel STARBIRD. That is correct.

Senator KERR. Let the letter from the Army be included in the record.

(The letter is as follows:)

February 7, 1955.

Hon. RICHARD M. NIXON,
President of the Senate.

DEAR MR. PRESIDENT: There is forwarded herewith a draft of legislation to amend section 5 of the Flood Control Act of August 18, 1941, as amended, pertaining to emergency flood-control work.

The submission of this legislation is in accordance with procedures approved by the Secretary of Defense. The Bureau of the Budget has advised that it has no objection to the submission of this proposal for the consideration of the Congress and the Department of the Army recommends its enactment.

The purpose of this proposed legislation is to amend the existing law concerning emergency flood work so as to provide authority for flood emergency preparation, and to eliminate the present requirement of maintenance of flood-control works threatened or destroyed by flood.

There are at the present time a number of functions performed by the Corps of Engineers in connection with emergency flood-control activities which are properly chargeable to the existing law but which are not specifically covered therein. In some cases certain of these activities are now charged to "General investigations," civil functions appropriations acts, and thereby result in unwarranted inroads on this limited appropriation. Such activities are preparation and dissemination of flood emergency manuals; general educational measures such as training and exercises for flood emergencies; inspection of organization and equipment and of flood-control works constructed by local interests; furnishing of technical advice to local interests; coordination with the Red Cross and with State and Federal agencies of the work of flood fighting and rescue, and emergency repairs and rehabilitation. The proposal to add the term "flood emergency preparation" to the existing law would clarify the authority for charging the cost of work of this nature to flood emergency appropriations.

With reference to the proposed elimination of maintenance, the purpose of the flood emergency appropriation is for work of an emergency nature and should not include ordinary maintenance of existing flood-control works. Because of the word "maintenance" in the present law, it has been administratively difficult to withhold allotments for the repair of flood-control works which should be maintained from other sources. As a result, funds available annually for true emergency work have been reduced. The effect of this elimination would be to permit the use of the entire emergency flood appropriation for the purposes for which it was basically intended.

The fiscal effect of this proposed legislation cannot be estimated.

Sincerely yours,

ROBERT T. STEVENS,
Secretary of the Army.

Senator KERR. Is there any question, Senator?

Senator COTTON. Just one. The words "repair" and "rehabilitation" refer only to the restoration of your own installations after the flood is over. Is that correct?

Colonel STARBIRD. That is not right, sir. We interpret that as giving authority to rebuild to the old standard, the old degree of protection, not only federally constructed works but locally constructed works where a reasonable flood protection is provided.

Senator COTTON. When I was in the House I served on a special committee of the Appropriations Committee after the Kansas-Missouri floods. At that time I was rather impressed by the number of Government agencies that were participating in the things that had to be done after the flood was over. We had the President's emergency fund being used, we had the Department of Agriculture in the picture, and we had at that time the RFC in the picture, and we had the Army engineers in the picture.

It was rather vague in my mind how these various agencies were coordinated and what functions were covered by the President's emergency funds that he allocated and what functions were covered by others. Does that situation still prevail?

Colonel STARBIRD. The current situation is that there is a very clear-cut line, sir. We only repair and rehabilitate structures and engage in actual flood fighting and rescue. If it is cleanup afterwards, sir, we only undertake that work if called upon by the Federal Civil Defense Administrator, and only to the extent that he calls upon us to do it.

Senator COTTON. My question is limited to what happens after the flood. The repair and rehabilitation—I am trying to get in my mind definitely, and I must have misunderstood you, I thought from your answer that you said your funds were used for the repair and rehabilitation of structures that belonged to the local communities or private industries. Is that true?

General ITSCHNER. Those structures which are flood-control structures.

Senator KERR. Like a local levee.

General ITSCHNER. Any other structures we cannot participate in the repair of.

Senator COTTON. It is not confined to Federal installations?

Colonel STARBIRD. It is not.

Senator COTTON. It is confined to structures that are purely for the control of floods?

Colonel STARBIRD. That is correct.

Senator COTTON. Thank you.

Senator KERR. Senator Cotton, I am going to suggest this: that we have a brief prepared on S. 15 and S. 1340, setting forth the proposal and recommendations of the Senators from Texas and the attitude of the engineers and the budget with reference thereto. I make that suggestion because both the engineers and the Bureau of the Budget approved S. 15, which was the original bill introduced by the Texas Senators, but do not approve the changes that they incorporated into S. 1340.

We will submit that to the full committee.

On S. 1069 tentatively I would suggest we recommend approval of that and submit the brief to the full committee, telling what it is.

On S. 1070 I would make the same suggestion, if you entirely concur, and then we will let the other members of the subcommittee know what we have suggested in that regard.

If there is nothing further we will recess until 10 o'clock in the morning.

(Thereupon, at 4:27 p. m., the subcommittee was adjourned, to reconvene at 10 a. m., Tuesday, April 19, 1955.)

FLOOD CONTROL—RIVERS AND HARBORS MISCELLANEOUS

TUESDAY, APRIL 19, 1955

UNITED STATES SENATE,
COMMITTEE ON PUBLIC WORKS,
SUBCOMMITTEE ON FLOOD CONTROL—RIVERS AND HARBORS,
Washington, D. C.

The subcommittee met at 10:05 a. m., in room 412, Senate Office Building, Senator Robert S. Kerr (chairman of the subcommittee) presiding.

Present: Senators Kerr (presiding), Bush, Gore, Cotton, Thurmond, Symington, Case, and Purtell.

Senator KERR. Senator Bush is going to conduct the hearings until Senator Gore gets here, and I have to go to a Finance Committee meeting; but you go right ahead.

Senator BUSH. Very well. At this time I would like to put into the record a copy of the bill.

Without exception a copy of Senate bill 414 will be inserted into the record and also a report from the Bureau of the Budget and the Department of the Army on Senate bill 414.

(The above-mentioned documents are as follows.)

[S. 414, 84th Cong., 1st sess.]

A BILL Authorizing a preliminary examination and survey of the New England, New York, Long Island, and New Jersey coastal and tidal areas, for the purpose of determining possible means of preventing damages to property and loss of human lives due to hurricane winds and tides

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That in view of the severe damages to the coastal and tidal areas of the northeastern seaboard of the United States resulting from the hurricanes of August 31, 1954, and September 11, 1954, the Secretary of the Army is hereby authorized and directed to cause a preliminary examination and survey of the New England, New York, Long Island, and New Jersey coastal and tidal areas, for the purpose of determining possible means of preventing damages to property and loss of human lives due to hurricane winds and tides, and the economics thereof, to be made under the direction of the Chief of Engineers.

SEC. 2. There are hereby authorized to be appropriated such sums as may be necessary to carry out the provisions of this Act.

EXECUTIVE OFFICE OF THE PRESIDENT,
BUREAU OF THE BUDGET,
Washington, D. C., January 31, 1955.

Hon. DENNIS CHAVEZ,
Chairman, Committee on Public Works,
United States Senate, Washington, D. C.

MY DEAR MR. CHAIRMAN: This will acknowledge your letters of January 18 and 19, 1955, requesting the views of the Bureau of the Budget on S. 414, authorizing a preliminary examination and survey of the New England, New York, Long Island, and New Jersey coastal and tidal areas, for the purpose of determining

possible means of preventing damages to property and loss of human lives due to hurricane winds and tides and S. 524, to authorize and direct a full investigation of the problem of protecting Narragansett Bay and the southern shores of New England from hurricane tidal floods.

You are advised that the Bureau of the Budget would have no objection to enactment of these bills.

Sincerely yours,

DONALD R. BELCHER, *Assistant Director.*

MARCH 15, 1955.

Hon. DENNIS CHAVEZ,
Chairman, Committee on Public Works,
United States Senate.

DEAR MR. CHAIRMAN: Reference is made to your request for the views of the Department of the Army with respect to S. 414, 84th Congress, a bill authorizing a preliminary examination and survey of the New England, New York, Long Island, and New Jersey coastal and tidal areas, for the purpose of determining possible means of preventing damages to property and loss of human lives due to hurricane winds and tides.

The Department of the Army has no objection to the enactment of S. 414, the purpose of which is stated in its title.

As a result of the severe hurricanes of August 31, 1954, and September 11, 1954, throughout the areas specified in the bill, local people, including the governors of many of the affected States, have expressed an interest in having the Corps of Engineers make an investigation to determine possible means of preventing damages due to such storms.

A study of preliminary examination scope would take 1 year to accomplish and is estimated to cost $350,000. This study would determine whether there is sufficient probability of justifying any improvement to warrant the expenditure of undertaking a detailed survey. It is estimated that a study of survey scope exclusive of the preliminary examination study such as that proposed in S. 414 would take 2½ to 3 years to accomplish. This type of study would be detailed and recommend for construction those projects considered engineeringly feasible and economically justified. A preliminary estimate of cost to the United States for the detailed survey is approximately $2,800,000.

The Bureau of the Budget advises that there is no objection to the submission of this report.

Sincerely yours,

ROBERT T. STEVENS, *Secretary of the Army.*

Senator BUSH. Now representing the Corps of Engineers, Mr. Page. Could you tell me approximately how much time your statement is going to take, Mr. Page?

Mr. PAGE. It can be very short, Senator.

Senator BUSH. We do not want it to be short, but would you say 5 or 10 minutes, because Senator Purtell has another hearing that he must go to.

How long approximately would you say?

Mr. PAGE. Ten minutes.

Senator BUSH. Senator, would you like to present yours first?

Senator PURTELL. If you would defer to me, I would appreciate it.

Senator BUSH. Would you defer then to Senator Purtell in order that he may go to his meeting?

Mr. PAGE. That is perfectly all right.

Senator BUSH. Without objection, we will hear Senator Purtell at this time.

Senator Purtell.

STATEMENT OF HON. WILLIAM A. PURTELL, A UNITED STATES SENATOR FROM THE STATE OF CONNECTICUT

Senator PURTELL. Mr. Chairman, I appreciate the opportunity afforded me to appear here this morning in support of bill S. 414 introduced by my colleague Senator Bush and calling for a preliminary examination and survey of the New England, New York, Long Island, and New Jersey coastal and tidal areas, for the purpose of determining possible means of preventing damages to property and loss of human lives due to hurricane winds and tides.

You, Senator Bush, have very ably presented your case, and the representative of Gov. Abraham Ribicoff of Connecticut, I am certain, will give you an expression of the seriousness of the situation as seen from the State's viewpoint and the willingness of officials there to cooperate in the development of protective works against hurricanes.

I will not, therefore, burden you with repetitious statistical data. Simply, may I say that this general area is one which has given me considerable concern for quite a period of time.

Early last fall I first took up the matter with the office of the Army engineers and had drafted for introduction in the Congress a bill which would, authorize and direct the Chief of Engineers, United States Army, to conduct a detailed study of the coastal areas of the New England States and of New York State for the purpose of determining the feasibility of protective works in such areas against hurricanes and other heavy storms.

Then, having found that Senator Bush had likewise prepared a bill which would serve the same general purpose, and inasmuch as he is a member of the Senate Public Works Committee, I naturally deferred to him then, and I now strongly urge that early and favorable action be taken on bill S. 414 and any other measure which may give us the relief and protection which we seek.

Mr. Chairman, three hurricanes of the force and destructive capacity of those visited upon the northeast area of the United States in 1954 have developed in all of us from that general area an awareness of the emergent need for action looking toward the development of engineering and economically feasible hurricane protective works.

Certainly, man cannot control the elements; but I feel we would be very remiss in our duty if we did not give early consideration, not only to the conduct of the study called for by this proposal, but, as early action as may be possible to the carrying out of such recommendations as may be forthcoming as the result of this suggested survey.

A survey is fine. That is the first necessary step, but I do hope that top priority may be given to this undertaking, and that before too great a period of time has passed, we may be back here again before you gentlemen urging the authorization of the recommended projects.

I thank you, Mr. Chairman, for your courtesy and attention, and I want to thank the gentleman who deferred to me so that I might attend another hearing.

Senator BUSH. The commitee is very grateful to you, Senator, for that very able statement.

Now, we will hear from Mr. Carter Page, representing the Corps of Engineers.

62536—55——8

STATEMENT OF CARTER PAGE, CHIEF OF THE PLANNING DIVISION, CIVIL WORKS, OFFICE OF THE CHIEF OF ENGINEERS, DEPARTMENT OF THE ARMY

Mr. PAGE. Thank you, Mr. Chairman. You requested that we testify on the two bills, S. 414 and S. 524.

The first, as you know, is a bill of broader scope, covering the New York, New England, and the New Jersey coastlines, while the second is limited to Narragansett Bay and a portion of southern New England.

In our comments which were favorable to this legislation, we pointed out that the bill 524 would not be necessary if the bill of broader scope was enacted.

In our report on these bills, we, as we normally do, indicated that the cost of the investigation would be about $2,800,000; and it would take us from 2½ to 3 years to complete the entire study. I would like to comment on that briefly.

In the first place, we have decided as a result of our studies during the New York-New England survey that what we term a preliminary examination will not be necessary. We felt that the case for going ahead with these surveys was so urgent that we should save all possible time and dispense with the preliminary examination procedure, although in some cases, we will make what is in effect a preliminary examination.

That we believe will save time.

It is our intention to proceed with this survey, if it is authorized, just as rapidly as possible. That rate of progress will, of course, depend upon the availability of money.

In all probability, we will find it necessary to proceed by priority areas. For example, the Narragansett Bay-Providence area where so much damage was done will undoubtedly be one of the high-priority areas; other areas along the coast where lesser damages were done, we will proceed by a sampling process to determine what, if anything, can be done.

I think we should make it plain that in this survey we are exploring somewhat of a new field. We know the damages were great. We do not know as yet just what we can do to protect the coastlines.

We believe that in certain areas where the bays and estuaries are, there are possibilities of economical protection.

The works will undoubtedly be expensive. We will, I believe, have to make model studies and will use the facilities of our Vicksburg Waterways Experiment Station and other hydraulic laboratories for that purpose.

I think that it would be presumptuous of me to comment on the damage because there are people here from New England who know much more about it than I. We have, in the course of the New York-New England survey, investigated the damage to a limited extent; and as you know damages from the 1954 series of hurricanes apparently amounted to well over $300,000,000 in New England.

If its damage in New Jersey and New York coastal areas was added it would be much greater. We are unable at this time, of course, to indicate what measures will be found practical.

I might very briefly run over a few possibilities. In the first place, we feel—I think it has been proven—that adequate hurricane-

warning service is essential. The fact that there was a relatively small loss of life in 1954 as compared with 1938, I think can be attributed largely to an effective or more effective warning service.

There must be education in evacuation, and routes for evacuation of coastal areas. Hurricane shelters should be given consideration.

Perhaps one of the most important measures that may be found practical and necessary will be some form of warning in exposed areas where protective measures will just not be possible or economical.

An important consideration will be proper building codes for hurricane-resistant construction.

Among the protective measures that may be practicable are seawalls, or breakwaters, to break the force of the hurricane-driven waves, and adequate drainage systems.

As you all know, the damage from a hurricane comes from three sources: The wind, the torrential rainfalls that accompany the hurricane, and the hurricane-driven tides and high waves.

It is my understanding that this latter factor perhaps caused the greater part of the damage in much of the New England area.

In proceeding with this survey, we will be faced with, I think, establishment of precedents, and examination of these matters from the standpoint of economics, who shall pay for them, the extent of the Federal interest; and we shall try to approach this matter to the best of our ability, and you can be sure the Corps of Engineers will make every effort to complete this survey as rapidly as possible.

Senator BUSH. Thank you very much, Mr. Page. Have you any questions?

Senator GORE. No, sir.

Senator BUSH. Thank you very much, sir. I should like at this point with the consent of the committee to put in the record as though I had read it a brief statement expressing my views concerning S. 414.

(The above-mentioned document is as follows:)

STATEMENT OF SENATOR PRESCOTT BUSH, OF CONNECTICUT, TO SUBCOMMITTEE ON FLOOD CONTROL, RIVERS, AND HARBORS, IN SUPPORT OF S. 414

Three hurricanes—Carol, Edna, and Hazel—struck Connecticut and other Eastern States in 1954, leaving in their trails a terrible toll in the loss of lives, hardships, and suffering by families in the coastal regions, and heavy damages to property. Estimates of the economic loss caused by these great sea storms have ranged as high as $1 billion.

The occurrence of three hurricanes in a single year, coupled with the past history of hurricanes in 1938 and 1944, indicates strongly that the North Atlantic States may now be considered as being in a new hurricane path.

This is a matter of great concern to my own State of Connecticut and the other affected States. At a Connecticut conference on shore protection, held at Clinton, Conn., on April 2, and attended by approximately 1,000 persons, including State officials, legislators, and officers of the affected communities, there was general agreement that there was need for coordinated action on all levels of government.

It is apparent that a comprehensive program for breakwaters, seawalls, and other protective works against tidal flooding resulting from the huge waves whipped up by hurricane winds will require detailed study by the Army engineers. For this reason, I introduced on January 14, 1955, S. 414, which would authorize and direct the engineers to survey the New England States, New York, and New Jersey, to determine possible means of preventing loss of lives and damages to property resulting from hurricane winds and tides.

In the meantime, work should go forward as rapidly as possible on previously authorized beach erosion control, navigation and other projects useful in a shore-protection program.

S. 414, as introduced, calls for a preliminary examination and survey which the Secretary of the Army estimates would cost $350,000 and take 1 year to accomplish. A detailed study, including recommendations for construction of projects considered engineeringly feasible and economically justified, would cost approximately $2,800,000, according to the Secretary's estimates, and take 2½ to 3 years to accomplish.

In view of the urgency of this problem, I request the subcommittee to give serious consideration to amendment of the bill to make it possible for the detailed study to be commenced at the earliest practicable date. With the danger that new hurricanes may strike our coasts next season and in the years to come, there is pressing need for action at the earliest possible moment.

Senator BUSH. I should also like, without objection, to place in the record a letter from Senator Irving Ives of New York, with which he submits a brief one-page statement, in favor of S. 414.

(The above-mentioned document is as follows:)

UNITED STATES SENATE,
Washington, D. C., April 15, 1955.

Hon. PRESCOTT BUSH,
Senate Office Building,
Washington, D. C.

DEAR PRES: With reference to the forthcoming hearings on S. 414, I am enclosing a copy of my statement in support of the bill. Inasmuch as I shall be unable to appear before the subcommittee to present this statement, you may want to submit it for the record following your testimony.

With kindest personal regards, I remain,

Sincerely yours,

IRVING M. IVES.

STATEMENT OF UNITED STATES SENATOR IRVING M. IVES SUBMITTED TO THE SUBCOMMITTEE ON FLOOD CONTROL, RIVERS, AND HARBORS OF THE SENATE COMMITTEE ON PUBLIC WORKS IN SUPPORT OF S. 414

I very much appreciate the opportunity to submit to your distinguished group this statement of my views in support of S. 414, introduced by the Senior Senator from Connecticut, Mr. Bush.

This legislation, which has the purpose of determining possible means of preventing damages to property and loss of human lives due to hurricane winds and tides, is urgently needed. The havoc wrought by the 1954 hurricanes is still fresh in our memory. Adequate protection against future hurricanes is now imperative.

The protection of human life is of primary concern The death of between 14 and 19 persons in New York State alone was reported as a result of Hurricane Hazel. In addition there was substantial damage from the various hurricanes to public and private property including shipping, utilities, transportation, agricultural, commercial, and industrial facilities. Inasmuch as the subcommittee has available the necessary data with regard to these losses, I shall not detail them here.

I would urge that consideration be given to an examination of inland areas in addition to the coastal and tidal areas as outlined in S. 414. For example, Hurricane Hazel moved northward through central Pennsylvania and struck at the central and western part of New York State, taking a serious toll in both life and property.

I hope S. 414 will receive favorable consideration by your committee and the Congress.

Senator BUSH. I should also like to place in the record at this point a letter I wrote to Chairman Cannon of the House Appropriations Committee urging provision of funds for projects which can be dovetailed into an overall plan resulting from the survey proposed by S. 414.

(The above-mentioned document is as follows:)

UNITED STATES SENATE,
April 12, 1955.

Hon. CLARENCE CANNON,
Chairman, Appropriations Committee,
House of Representatives, Washington, D. C.

DEAR CHAIRMAN CANNON: I am advised that the Public Works Subcommittee of the Appropriations Committee of the House of Representatives will, in all probability, begin hearings in the near future on appropriations for projects recommended by the Army engineers.

This is to inform you of the deep interest of the State of Connecticut in the provision of sufficient funds to underwrite the Federal share of beach-erosion control, flood control, and navigation projects in our State which have already been authorized by the Congress and for which plans have been completed.

As you know, Connecticut and other States in the Northeast were struck by Hurricanes Carol, Edna, and Hazel in 1954. These terrible storms took many lives, caused widespread distress and suffering among families living in the coastal areas, and resulted in property damages in excess of $240 million. The occurrence of three hurricanes in a single year, coupled with the previous history of hurricanes in 1938 and 1944, indicates strongly that the New England States may now be considered as being in a new hurricane path resulting from some change in weather patterns.

A program which will provide maximum protection against loss of lives and property damages resulting from hurricanes will entail further study by the Army engineers. For that reason, I have introduced S. 414, to authorize a survey of the coastal and tidal regions of the New England States, New York, and New Jersey, to determine possible means of preventing loss of lives and damages to property due to hurricane winds and tides. An identical bill, H. R. 5354, was introduced recently in the House of Representatives by Hon. Horace Seely-Brown, Member of Congress, Second District, Conn.

It is my hope that the survey proposed by these bills will result in detailed recommendations by the Army engineers for breakwaters and other protective works which will provide maximum security for the many thousands of families and business establishments in areas now exposed to the full fury of hurricanes.

In the meantime, however, there is pressing need for proceeding with maximum speed to completion of projects which have already been authorized by the Congress. I have been assured by Col. Robert J. Fleming, Jr., division engineer at Boston, Mass., that the construction of authorized projects will not interfere in any way with an overall protective plan which would result from the proposed survey. In fact, many, if not all, of the authorized projects would be dove-tailed into such a plan without difficulty.

It would be desirable to coordinate the presently authorized projects so that the maximum amount of restoration of our beaches could be accomplished. For example, projects involving the dredging of harbors or river channels furnish large quantities of sand which can be placed at areas where the beaches have been washed away, leaving only rocks and mud behind.

At a recent conference on shore protection, called by Governor Abraham Ribicoff, of Connecticut, and attended by approximately 1,000 persons, including State officials, legislators, and officers of the affected municipalities, there was general agreement that the time for coordinated action on all levels of government has arrived. The State and the towns are preparing to furnish their fair share of the cost. There is strong feeling that the Congress, having authorized the projects, should fulfill at once its implied promise to provide the required Federal funds.

For your ready reference I list below the Connecticut projects which have been authorized by the Congress in prior years, with the latest available cost estimates of the Army engineers:

Beach-erosion control

Location	Estimated first cost [1]	Federal share	Non-Federal share
Jennings Beach and Ash Creek, Fairfield [2]	$44,000	$14,700	$29,300
Saseo Hill Beach, Fairfield	63,000	21,000	42,000
Southport Beach, Fairfield	42,000	14,000	28,000
Burial Hill Beach, Westport	24,000	8,000	16,000
Sherwood Island State Park, Westport	475,000	158,300	316,700
Compo Beach, Westport	165,000	55,000	110,000
Hammonasset Beach, Madison [3]	500,000	167,000	333,000
Middle Beach, Madison	61,400	20,400	41,000
Prospect Beach, West Haven	282,000	84,600	197,400
Woodmont Shore, Milford	181,900	42,400	139,500
Gulf Beach, Milford	39,300	13,100	26,200
Silver, Myrtle, Walnut, Laurel, and Cedar Beaches, and Meadows End, Milford	549,000	18,300	530,700
Short Beach, Stratford	79,500	26,500	53,000
Seaside Park, Bridgeport	357,000	119,000	238,000

[1] 1953–54 cost estimates.
[2] Work completed. Appropriation authorized by Congress.
[3] Work in progress. No appropriation authorized.

The only appropriation as yet made by Congress is that of $14,700 for the work at Jennings Beach and Ash Creek, Fairfield.

Active authorized navigation improvements in Connecticut

PROJECTS ON WHICH NO CONSTRUCTION HAS BEEN ACCOMPLISHED

Project	Estimated Federal cost	Local cash contribution	Estimated local cost (other)
Connecticut River below Hartford:			
Dredge North Cove at Old Saybrook	$353,000	$67,500	$10,000
Dredge Eightmile River	52,000	18,000	5,000
Guilford Harbor: Dredge 6-foot channel and anchorage	110,000	25,500	----------
Mystic River: Channel widening, anchorage, and turning basis	101,000	14,000	20,000
Patchogue River: Channel work and jetty construction	135,000	90,000	----------
Stonington Harbor: Dredge 6-foot anchorage and remove Penquin Shoal	85,000	5,500	8,000
Westcott Cove: Dredge 8-foot channel	49,000	21,000	8,000
Westport Harbor and Saugatuck River: Dredge 9-foot channel	113,000	37,500	10,000

PROJECTS ON WHICH CONSTRUCTION HAS BEEN PARTIALLY COMPLETED

Project	Estimated Federal cost	Funds to date	Local cash contribution
Housatonic River: Channel 18-feet deep to Culvers Bar	$1,350,000	$400,000	$200,000
Connecticut River below Hartford: 15-foot channel	539,000	464,000	20,000
New Haven Harbor: 35-foot channel and 22-foot Quinnipiac River Channel	3,367,000	2,857,000	----------

Note: $510,000 to complete Quinnipiac River Channel completes this project.

Active authorized flood-control projects in Connecticut

Project	Estimated Federal cost	Funds to date	Balance to complete
Hartford (Folly Brook): Construct 700 feet of earth dike and extend existing pressure conduit 1,900 feet	$303,000	$40,000	$263,000
Norwich Channel improvement	1,240,000	1,013,000	227,000

Of the above listed projects, three are included in the President's budget request for 1956. They are:

Housatonic River, balance to complete	$750,000
Folly Brook at Hartford, completion of project	263,000
Hammonasset Beach, Federal share	167,000

These projects, of course, have passed the detailed scrutiny of the Bureau of the Budget and appropriations have been recommended as fully justified.

It is my strong belief that justification for appropriating the Federal share of the remaining projects at the present time can be found in the emergency conditions created by the 1954 hurricanes, and the need for proceeding as rapidly as possible before a new hurricane season is upon us.

We in Connecticut are, of course, fully aware of the many requests for appropriations which are received by your committee, and of the need to keep the Federal budget within reasonable proportions. As Federal taxpayers in a State which, per capita, contributes a much larger amount to the Federal Treasury than do many other States, we are fully conscious of the desirability of avoiding unnecessary expenditures. However, we feel strongly that the problem of protecting our Connecticut shore front, an invaluable asset to our State, has reached emergency proportions requiring action on all levels of government. As we in the past have not hesitated to support Federal assistance to meet emergencies in other parts of the country, we now feel that we are fully entitled to ask the Congress to keep the implied promise to appropriate the required funds for projects it has authorized, projects whose construction is needed to help us meet the emergency we face.

For the foregoing reasons, I earnestly request the sympathetic consideration of your committee, and hope for favorable action. I would appreciate it if you would advise me in advance of the dates on which the hearings will be held so that I may give ample notice to those in Connecticut who are deeply interested in this matter.

Respectfully yours,

PRESCOTT BUSH, *United States Senator.*

Senator BUSH. Also I should like to insert following that a letter from Hon. Abraham Ribicoff, Governor of the State of Connecticut, to Hon. Clarence Cannon, chairman of the House Committee on Appropriations, concurring in the request which I made to Mr. Cannon.

(The above-mentioned document is as follows:)

STATE OF CONNECTICUT,
EXECUTIVE CHAMBERS,
Hartford, April 15, 1955.

Hon. CLARENCE CANNON,
Chairman, Committee on Appropriations,
House of Representatives, Washington, D. C.

DEAR CHAIRMAN CANNON: Under date of April 12, Senator Prescott Bush wrote you concerning the needs of the State of Connecticut which are to be considered by the Public Works Subcommittee of the Appropriations Committee of the House of Representatives. All of us in the State of Connecticut are vitally interested in all the projects listed in this letter.

I heartily endorse the requests and sentiments of Senator Bush and trust that your committee may report favorably on these projects.

With best personal regards from a former colleague, I am,

Sincerely,

ABRAHAM RIBICOFF, *Governor.*

Senator BUSH. Also, I would like to include the Army engineers' résumé report of the effect upon New England of hurricanes. That should go into the record.

(The referenced report follows:)

HURRICANE OF SEPTEMBER 1938

20. *General.*—A most destructive hurricane arrived in the New England-New York region on September 21, 1938. It cut directly across Long Island, reaching the shore of Connecticut near New Haven, in the midafternoon of the same

day. It continued northward following the general line of the Connecticut River Valley. Tropical storms of the intensity of this storm have been uncommon in this area, generally swinging off into the North Atlantic. The lack of recent hurricane experience resulted in its striking without adequate warning. The devastation in the coastal areas was increased by the synchronization of the hurricane tide with the normal gravitational high tide. Further, with the late afternoon arrival of the highest tide, darkness set in to add to the confusion of those persons fleeing for their lives. Fortunately, the summer vacation season had ended and the majority of the people with shore cottages had returned to their permanent homes. However, at inland points along the rivers heavy antecedent rainfall had saturated the ground and filled the rivers to capacity. The additional rain accompanying the hurricane forced the rivers to overflow their banks, with consequent damaging flood conditions.

21. *Antecedent conditions.*—Immediately prior to the arrival of the September 1938 hurricane, the New England area had been subjected to a period of abnormal precipitation. Between the 12th and 16th of September up to 4 inches of rain had fallen, saturating the ground in most of the New England States. There was comparatively little surface runoff from these rains and the ground became thoroughly saturated. On September 17 precipitation, starting with light showers and increasing in intensity, continued until September 21, when the heavy hurricane rainfall occurred. The total precipitation during this latter period including 6 inches on the 21st, averaged nearly 12 inches over an area of 10,000 square miles, with an average of slightly over 16 inches falling over Connecticut and central Massachusetts. The antecedent precipitation had filled the brooks and streams to capacity, so that the rains accompanying the main storm were more than enough to cause the rivers to overflow their banks and flood the low areas.

22. *The hurricane.*—The meteorological conditions existing on September 21, 1938, were just right to invite the hurricane to New England. A trough of low pressure, extending from North Carolina into central New England, lay between a high-pressure area over Newfoundland and another to the west over the eastern Great Plains. The hurricane, originating, like most similar disturbances, in the lower latitudes, had followed a general northerly course at a modest speed. It had been recognized as a fully developed hurricane by September 18, and radio advisories were issued to all vessels at sea. On the morning of September 21 it was centered off Cape Hatteras, after which its forward speed increased. Instead of veering off to the northeast over the Atlantic Ocean, it continued northward up the trough of low pressure, which was the path of least resistance, reaching the region in midafternoon. Its speed of approach was probably over 80 miles an hour. The accompanying winds varied from 75 miles per hour near sea level to over 120 miles per hour at higher elevations (for 5-minute durations), with gusts in excess of 150 miles per hour at several locations.

23. *Damages.*—The damages inflicted by the hurricane of 1938 were the heaviest that New England and Long Island had experienced from this type of storm. Along the coast the losses were principally from tidal flooding and wind, whereas the inland sections suffered from river flooding and wind damage. Classes of damage are described in the following subparagraphs:

(*a*) *Loss of life.*—As a result of this disastrous hurricane, more than 500 persons lost their lives. Over 200 of these were in Rhode Island alone, where, in addition to very strong winds, tidal flooding was extensive and severe. The winds arriving in midafternoon damaged many trees and homes and disrupted the power systems. This situation, plus the fact that the hurricane tide arrived in the premature darkness, hindered evacuation activities in the coastal areas.

(*b*) *Public.*—Damage to public works and property was widespread. Buildings, parks, and roads located near the shore were destroyed or flooded by the force of the wind-driven waves and high tides. Transportation came to a virtual standstill when bridges were swept away, highways washed out, flooded, or made impassible by falling trees and power lines. Many movable bridges were inoperative, due to the flooding of their operating mechanisms. Damage to railroads, from washouts, lost bridges, damaged operating equipment, and rolling stock, was also high. Communication and power facilities were seriously disrupted when underground conduits were flooded and overhead wires were tangled amidst fallen trees and poles.

(*c*) *Private.*—The principal destruction to private property occurred along the coast from tidal flooding, although at many locations along the inland rivers whole towns were inundated and houses swept away by floodwaters. Numerous shorefront communities were almost entirely wiped out by wind and wave. In

the harbors and inlets thousands of small boats were lifted and dashed on the shore or smashed against the piers.

(*d*) *Commercial.*—The losses to commercial establishments were severe. The city of Providence, R. I., especially was hard hit when the high tide and hurricane combined to flood a 1¼-square-mile area of the business district. Cities and towns that were inundated by the overflowing rivers also experienced serious commercial damages, but these were less extensive than in the coastal areas. Commercial fishing enterprises suffered a terrible blow to their business as whole fleets of fishing boats were demolished. No estimate is available of the total commercial damage incurred in the region. As an example of the seriousness of these damages, Providence suffered direct losses estimated at over $10 million, equivalent to about $24 million at a 1954 price level.

(*e*) *Industrial.*—No estimate of losses sustained by industrial concerns alone is available, although they were extremely high. In the coastal area, tidal flooding occurred on the ground floors at scores of plants and the consequent damage to machinery, equipment, and material amounted to many millions of dollars.

(*f*) *Utilities.*—Public and private utilities were among the hardest hit. Generating equipment, powerplants, distribution systems, and electrical equipment were put out of use, destroyed, or badly damaged. Their repair and restoration, especially in flooded areas, were slow, tedious, and costly. In the Providence area underground wiring was damaged by salt water and had to be replaced or repaired. Water-supply systems suffered damages especially in Massachusetts; and sewerage systems were disrupted in southern New England.

(*g*) *Agriculture.*—The majority of farm buildings were endangered by wind and those that were located in the low-lying areas near the overflowing rivers suffered flood damages as well. The greatest agricultural loss was to unharvested crops, and to the cropland. The large, onion-growing section of the Connecticut Valley in western Massachusetts, and the rich tobacco land in Connecticut suffered heavily. Stacks of hay were strewn across the countryside. The nearly ripe fruit orchards were flattened and the fruit was destroyed. Thousands of vegetable gardens with late-growing crops were damaged.

(*h*) *Military.*—Army, Navy, and Coast Guard posts located near the coast sustained considerable damage. Buildings were demolished, piers and docking facilities badly battered, repair shops and equipment were flooded, and boats were grounded and crushed.

(*i*) *Harbors and shipping.*—Damages to harbor-protection works that were exposed to wave attack were heavy. In New England the cost of repair of breakwaters and jetties was estimated as close to $500,000. Seawalls and bulkheads were also extremely hard hit. Many docks and piers were reduced to a few sticks and pilings, much of the damage being caused by boats striking them. Lighthouses in exposed locations, although constructed to withstand exposure to heavy storms, suffered severely. Within the Long Island Sound area, alone, damages to lighthouse structures and supply depots was nearly $1 million. Boats of all descriptions, including tankers, freighters, passenger vessels, tugs, and barges, were damaged or destroyed, as many were driven ashore. New England fishing fleets, suffered heavily with nearly the entire Rhode Island and Connecticut fleets destroyed.

24. *Summary.*—The hurricane of September 21, 1938, was the most destructive storm, damagewise, to reach the New England-New York region up to that time. Losses are reported to have totaled about one-third of a billion dollars based on 1938 price levels, but no detailed figures are available to support this estimate. Over 500 lives were lost. Devastation was widespread, with the major part of the damage being caused by tidal flooding and wind along the coastline. The supplemental report on hurricane of September 21, 1938 prepared by the United States Engineer Office, Providence, R. I., indicated damages from tidal flooding along the southern coast of New England totaling $55 million. Not considering the great building expansion and increase in economic activity that has taken place since that date, the damage would exceed $145 million based on 1954 price levels. No comparable figures are available for wind damage.

25. The long period of antecedent precipitation and the extremely heavy rainfall accompanying the hurricane produced floods which are presently the historical floods of record at many localities. Major floods occurred in the Merrimack, Thames, Connecticut, and Housatonic River Basins which resulted in damages estimated at over $70 million. Recurrence of floods of equal magnitude in those basins would cause damage estimated at $165 million at a 1954 price level.

HURRICANE OF SEPTEMBER 14–15, 1944

26. The center of the hurricane of September 14–15, 1944, after crossing the eastern end of Long Island reached New England shores at Westerly, R. I. Fortunately it arrived on the ebb tide, so that the destruction associated with tidal flooding was not evidenced. Rainfall was heavy, with 4.5 inches falling in a 6-hour period at Providence. The storm traveled in a northeastward direction, leaving the New England area north of Plymouth, Mass. The majority of the damage in southern New England and on Cape Cod was to shores and beaches, shore property, and some harbor installations. Water-supply systems suffered minor damages in Massachusetts and Rhode Island. The maximum wind velocity (for a 5-minute period) recorded at Block Island was 82 miles per hour. Extreme and gust wind velocities exceeded 90 miles per hour at many locations in Connecticut, Rhode Island, and Massachusetts. In the New England area, it was reported that 30 lives were lost, over 1,300 houses damaged or destroyed, and nearly 650 boats demolished or badly battered.

HURRICANES OF 1954

27. *Hurricane Carol.*—The center of Hurricane Carol crossed the south shore of Long Island slightly east of West Hampton about 8:30 a. m. (EST) on August 31, 1954. An hour later, it passed into Long Island Sound off Cutchogue. By 10:30 a. m. (EST), it was over the southeast shore of Connecticut near the mouth of the Connecticut River. Curving slightly on a northward course, the center passed 5 to 10 miles west of Worcester, Mass., about noon and penetrated into south-central New Hampshire about 1:30 p. m. (EST). In midafternoon, the strength of Carol's winds and its speed of forward progress diminished as the center traveled northward over the rugged terrain of New Hampshire. At 7:30 p. m. (EST), the center was located at latitude 46° N., longitude 71° W., just north of the Canadian border, and the weakening storm had lost all hurricane force.

28. In Long Island and New England the storm damage may be divided into three principal classes. The first, caused by wind alone, was most severe over the area east of the hurricane's centerline of passage and south of the northern border of Massachusetts. This area included Long Island east of Riverhead; New London, Tolland, and Windham Counties, in extreme eastern Connecticut; all of Rhode Island; and Massachusetts east of the Webster-Worcester-Fitchburg line out to the "elbow" of Cape Cod. The area was swept during the morning by sustained winds of hurricane force with gusts up to 125 miles per hour. Countless trees were toppled, blocking roads, smashing buildings and automobiles, and wrecking electric and telephone lines. Roofs, chimneys, steeples, aerials, signs, windows, store fronts, radio and television broadcasting towers were damaged or destroyed. All forms of transportation were crippled. In this heavily populated area, the ordinary activities of daily living were forcibly suspended by the storm. Hundreds of thousands of families had to do without telephone service and without electricity for cooking and lighting for days until utility workers were able to effect repairs. Streets and highways were quickly cleared of fallen trees, but not until a week had elapsed were utility services generally restored to normal. In addition, numerous factories (in Rhode Island especially) were so badly damaged that workers could not return to their jobs for periods ranging from several days to 3 weeks, with consequent heavy financial loss.

29. Similar but lesser devastation took place during the morning over central Long Island and the strip of Massachusetts and Connecticut extending from the path of the hurricane center to the Connecticut Valley. This district was lashed by 45 to 55 miles per hour sustained winds, with gusts to 65 miles per hour, and by even higher winds close to the center of the storm. In the afternoon, winds of like force pummeled the southwestern corner of New Hampshire, the portion of the same State east of the path of the storm center and south of Lake Winnipesaukee, and southwestern and south-central Maine. Along the New Hampshire and Maine coasts east to the Kennebec River, winds were higher than over the rest of northern New England; sustained speeds were in the 60 to 70 miles per hour class and gusts ranged to 80 miles per hour. Vermont, central and northern New Hampshire, most of Maine, and the western parts of Massachusetts and Connecticut experienced gale-force winds, but no really severe velocities, and the same held true for eastern New York State including the western end of Long Island.

30. The second and most devastating type of storm damage was that inflicted on shore areas by tidal flooding. The hurricane struck Long Island and southern New England close to the time of gravitational high tide; this circumstance combined with the hurricane tide flooded harbors, beaches, and similar low-lying areas and wrecked everything in the path of the water. Seaside resorts, thronged by thousands of vacationists, were thus areas of particularly heavy damage. Were it not for the prompt and efficient measures taken by local governmental, police, and civilian defense agencies to evacuate people from beach cottages and hotels the loss of life would have been far greater. Wave damage extended during the afternoon to include the New Hampshire shore and much of the Maine coast.

31. The third type of damage was the havoc done to pleasure and fishing craft and shore structures by the combined action of wind and water. An estimated 4,000 small craft were thereby either seriously damaged or destroyed, as they were torn from their moorings, sunk, or pounded on the shore.

32. A summary of storm effects resulting from Hurricane Carol by States follows:

(*a*) *New York State.*—The center of the hurricane traversed the eastern end of Long Island along the West Hampton-Cutchogue line during the hour between 8:30 and 9:30 a. m., (eastern standard time). Severe wind damage occurred from about the Sayville-Port Jefferson line all the way out to Montauk Point, and was at a maximum between the West Hampton-Riverhead-Cutchogue area and Montauk Point. From the Bayshore-Islip-Northport area westward, wind damage was less severe and was relatively small in and around New York City. Water and marine damage, however, was heavy all along the sound on both the Long Island and Westchester shores. This type of damage was also high along the eastern and central portions of the southern coast of Long Island. Montauk Point was isolated by a severe washout east of Amagansett, and the 300-foot Mackay radio tower there was blown down. In Port Jefferson Harbor, on the north shore, over 40 small craft were damaged or destroyed. The 200-foot ferryboat *Orient* was driven ashore by the storm. Peak wind gusts reported during the hurricane at Long Island locations include: 54 miles per hour at New York International Airport; 62 miles per hour at La Guardia Field 85 miles per hour (rooftop level) and estimated 125 miles per hour (410-foot level) at Brookhaven National Laboratory.

(*b*) *Connecticut.*—Carol's center traversed the extreme eastern part of Connecticut between 10:30 and 11:30 a. m., (eastern standard time.) Wind damage was relatively light in western Connecticut, but increased eastward from moderate to severe over the rest of the State. Water and marine damage was heavy along the entire coast, and greatest in the New London-Groton-Mystic section. In these towns, waters flooded not only the beach areas but the business and permanent residential districts as well. Notable also was water damage at Stonington, in the New Haven area, at Bridgeport and Stamford. New London, Middlesex, and New Haven Counties were designated disaster areas. Peak gusts observed during the hurricane are the following: 60 miles per hour at Bridgeport; 64 miles per hour at Hartford; 65 miles per hour at New Haven; and 80 miles per hour at Windsor Locks.

(*c*) *Rhode Island.*—Rhode Island was very hard hit, being in the zone of strongest winds as the hurricane passed northward through nearby Connecticut. Its southern coast and the numerous waterways associated with Narragansett Bay were scenes of enormous water and marine damage. The downtown section of Providence was flooded and Westerly was especially hard hit. Indeed, the worst of the hurricane's fury was concentrated on this State, all of which was declared a disaster area. A peak gust of 105 miles per hour was recorded at the Providence Weather Bureau Airport Station; 130 miles per hour at Block Island; and an estimated 125 miles per hour at Quonset Point Naval Air Station.

(*d*) *Massachusetts.*—The center of the hurricane traversed the State from about 11:30 a. m. to 12:30 p. m., eastern standard time. Wind damage was light in the western third of the State, moderate to heavy in the central portion, and heavy throughout the entire eastern area, except relatively light on Martha's Vineyard, Nantucket, and the outer part of Cape Cod. Water and marine damage were heavy all along the coast, with the maximum in Buzzard's Bay and along the southern side of the cape eastward to Chatham. Population centers, such as Fall River, New Bedford, Brockton, Boston, Worcester, Lawrence, and Lowell sustained major losses. In Boston, a noteworthy feature of the storm was the toppling of the steeple of historic Old North Church. The following counties were designated disaster areas: Suffolk, Essex, Middlesex, Norfolk, Plymouth,

Bristol, Barnstable, Dukes, and Nantucket. Peak gusts include: 100 miles per hour at Blue Hill Observatory in Milton; 88 miles per hour at Otis Air Force Base near Falmouth; 77 miles per hour at Nantucket; 52 miles per hour at Pittsfield; 93 miles per hour at Salem Coast Guard Air Station; and 71 miles per hour at Westover Air Force Base near Springfield.

(*e*) *New Hampshire.*—The center of the hurricane pushed northward through New Hampshire during the afternoon. Since the storm's intensity was diminishing, central and northern New Hampshire sustained relatively light wind damage. This type of damage was moderate to heavy in the southern portion, and greatest in the southeast, where Strafford County was designated a disaster area. Water and marine damage was extensive along the coast, at such crowded beach and boating centers as Hampton, Portsmouth, Exeter, New Castle, and Dover. In addition, approximately 150 small craft on Lake Winnipesaukee were damaged or destroyed. The following peak gusts were experienced in New Hampshire: 63 miles per hour at Concord; 65 miles per hour at Laconia; 41 miles per hour at Lebanon; and 52 miles per hour at Grenier Air Force Base near Manchester.

(*f*) *Maine.*—Maine, on the dangerous side of the storm, sustained heavy wind, water, and marine losses. Most of the damage was suffered in the southwest and south-central portions, and along the coast eastward to Bath. The northeastern coast and the northern interior was out of range of the severe part of the storm. York, Cumberland, Sagadahoc, Lincoln, Knox, and Waldo Counties were designated disaster areas. Portland, Brunswick, Auburn-Lewiston, and Augusta were hard hit. Peak gusts include: 73 miles per hour at Dow Air Force Base near Bangor; 78 miles per hour at Portland; 84 miles per hour at Brunswick Naval Air Station; estimated 40 miles per hour at Greenville; 48 miles per hour at Houlton; and 50 miles per hour at Old Town.

(*g*) *Vermont.*—Vermont was on the western side of the weakening hurricane as it traveled northward through New Hampshire, and thus had the least damage of any part of New England. Heaviest property and utility damage was experienced in Brattleboro and adjacent areas in the southeast. Montpelier's peak gust was 35 miles per hour, Newport's was 25 miles per hour, Burlington's 50 miles per hour.

33. *Hurricane Edna.*—Hurricane Edna, the second such storm to visit the east coast within 11 days, struck Long Island and New England another blow on September 11, 1954. Smashing into Martha's Vineyard shortly after 1 p. m., it crossed Cape Cod Bay, following a slightly curving northeasterly course offshore; it headed toward extreme eastern Maine and passed close by Eastport, Maine, into New Brunswick shortly after 7:30 p. m. Thus, nearly all of Long Island and New England, except Cape Cod and the islands to the south, were on the west or north side of the storm, and were spared the full brunt of the wind force. Highest gust velocities in these areas came with the storm's backlash and reached to above 90 miles per hour. Gusts above 100 miles per hour were recorded on Martha's Vineyard and outer Cape Cod.

34. Major damage was produced by the very intense rainfall preceding and attending the storm's onslaught. The rainfall was of excessive and near-record intensity for a number of hours and amounts of 4 to 8 inches were general along coastal areas, southeastern New England, and eastern Maine. Local floods and washouts were widespread. Southern and eastern Maine areas were especially hard hit, with drownings; highway and railroad right-of-ways honeycombed with treacherous washouts; many trees felled, taking electric and telephone lines down with them, and substantial losses to grain crops in Aroostook County. Major losses in other parts of the affected areas were of a similar nature—road washouts, serious floods, and electric and telephone lines downed by felled trees.

35. *Hurricane Hazel.*—The center of Hurricane Hazel moved northward through central Pennsylvania, and entered the western portion of the region in New York State south of Lake Ontario at about 8:30 p. m. on October 15, 1954. The storm produced recorded gust winds of 75 miles per hour at about 10 o'clock in Syracuse, lying to the east of the center, and of 73 miles per hour at about 11:30 p. m. in Buffalo, to the west of the center. Maximum wind velocities of 90 miles per hour were experienced in the Finger Lakes area. It brought wind gusts up to 79 miles per hour as far east as western Long Island and produced damaging waves in that area. Unlike Hurricanes Carol and Edna, rainfall accompanying Hurricane Hazel was relatively light in the region, except in the extreme western portion. Jamestown, N. Y., which lies a few miles outside the extreme southwestern portion of the region, had 5 inches of rainfall

during a 24-hour period ending 7 a. m. on the 16th of October and over 1½ inches of rain fell in the vicinity of Buffalo and Niagara Falls. Rainfall was very light or absent in the Finger Lakes portion of the region.

36. Because of the moderate to small amounts of rainfall throughout much of the region during the storm, flood damage was not widespread. Serious damage from flooding was reported only in Chautauqua County, the westernmost county in the region. Minor damage was caused by the overloading of local drainage facilities in Buffalo and Niagara Falls, N. Y. The principal damage in the latter areas and the only damage at other points in the New York State portion of the region was caused by high winds. Trees and large branches were blown down carrying utility wires with them. Falling trees also damaged buildings and blocked highways. There was extensive damage to TV aerials, and some roofs were damaged. Small boats were damaged by wind and wave in western Long Island waters.

37. The principal damages were suffered by residential and commercial properties, and by utility services. Utility customers were affected for varying periods by loss of utility service. Full service was restored throughout the region in about 3 days; however, many of the repairs were of a temporary nature. The most serious damages to both utility services and to residential and commercial property resulting from Hurricane Hazel were suffered in an area in west central New York, centered on Syracuse.

37a. The major damage areas in New England are shown on plates 66 and 66A. The major damage areas for Long Island, N. Y., and vicinity are shown on plates 67 and 68.

DAMAGES CAUSED BY 1954 HURRICANES

38. *General.*—In general, damage figures presented in this section are limited to estimates of damage sustained in coastal cities and towns, except those resulting from Hurricane Hazel. All estimates are based on information obtained from Federal, State, city, and town officials; from responsible officials in industrial and commercial enterprises; and from trained damage survey personnel specially assigned to investigation.

39. Time and personnel limitations precluded detailed coverage of each community affected by the 1954 hurricanes, however, all communities having tidewater frontage were inspected. Available estimates of damages sustained in inland communities from hurricane winds and rains are included.

40. Unless otherwise noted, all damage figures for New England include both direct damages to structures and equipment, and indirect damages such as loss of revenue and wages. Damage figures for areas in New York State do not include loss of revenue and wages. Where applicable, separate, estimates are indicated for damages attributable to each of the three hurricanes. In general, estimates are given by States, but detailed estimates have been provided for such critical damage zones as Fairfield and New London, Conn.; Newport, Bristol, and Providence, R. I.; and Assonet and New Bedford, Mass.

41. *Loss of life.*—Records of the five hurricanes that have struck the New England-New York region during the past 16 years indicate that the greatest danger to life has been from water rather than from wind alone. The heaviest tolls have unquestionably occurred as a result of tidal flooding although exact figures are not available. The most significant factors determining the degree of danger appear to be the adequacy of warning services, the relative timing of gravitational and hurricane tides, and the season of the year and time of day the hurricane occurs. Of these, there seems little doubt that the adequacy of the warning system, is the most important single factor. Improved forecasting techniques and warning devices, as well as the general awareness of danger among coastal residents were the major factors in the relatively small loss of life experienced in the 1954 hurricanes as compared with the 1938 hurricane.

42. Hurricane Carol (August 31, 1954), although occurring at the height of the summer recreational session, found both coastal and inland residents more fully aware of hurricane danger than was the case in 1938. Forecasting techniques, warnings, and evacuation helped to protect affected populations. In addition, the hurricane struck in the morning in full daylight, aiding the orderly evacuation of dangerous coastal areas. Consequently, in spite of extreme tidal flooding, the loss of life was surprisingly low. The center of Hurricane Edna, which struck the region 11 days later, passed over the eastern end of Cape Cod. This storm was well forecasted and widely publicized. As it came at a time of relatively low gravitational tide and affected a smaller area, it was not accompanied by serious tidal flooding. The loss of life was much less than in Hurricane Carol.

43. Total lives lost in New England in both Hurricane Carol and Hurricane Edna has been reported by the American Red Cross to have been 58, with 27 deaths in Massachusetts, 21 in Rhode Island, 8 in Maine, and 1 each in Connecticut and New Hampshire; 3 lives were lost in Long Island. No exact information is available on the number of deaths assignable to various contributory causes. It is known, however, that the vast majority were by drowning, occurring either as boatowners attempted to save their craft, as people fled to safety from the coast, or as a result of the flooding of interior rivers. Other fatalities were caused by falling trees, flying debris and by overexertion. It is reported that Hurricane Hazel contributed to the deaths of 2 persons in New England and between 14 and 19 persons in New York State.

44. *Public property.*—The damages sustained by various public properties in severe hurricanes such as the three affecting the region in 1954, particularly to trees, highways, and coastal structures, are comparable in monetary terms to the widespread damages to private, commercial, and industrial property. In general, although some damage was sustained by public buildings such as schools, halls, libraries, water, and sewage works, and by such installations as military bases, the bulk of hurricane damages to public property was that occurring to highways and bridges, public parks and forests, and to publicly owned beaches, shore recreational structures, shore protective structures and navigational improvements. Damages to various types of public properties are described in the following paragraphs. Detailed damages to public works in New England are shown in table 85.

45. *Public buildings.*—Damage to public buildings was not particularly serious or extensive in comparison to damage to other public property. In inland areas, primary damage was due to wind effect on roofs and windows with secondary damage due to rain entering openings made by wind action. Damage was more extensive in coastal locations. In some instances public buildings were affected by tidal flooding such as the city hall and post office at Providence, R. I., and a fire station at New London, Conn. Bathhouses were destroyed at Osprey Beach and Shenecosset Beach in Connecticut, and Napatree Beach in Rhode Island. At Nahant, Mass., a recently constructed school gymnasium collapsed.

46. *Highways.*—In many inland towns and municipalities which did not suffer flooding, the principal loss in 1954 hurricanes appeared to be the cost of clearing fallen trees and debris from public streets and from other publicly owned property, and of restoring roads washed out by the accompanying rains. In coastal areas, many roads and beach parking areas were covered with sand, debris, or both; others were washed out, undermined, or endangered by damages to protecting revetments or walls. Typical of such damages were: those suffered between Westhampton and Montauk Point on the south shore of Long Island, roads were inundated and buried under sand; at Hammonasset Beach, Conn., 18 inches of sand covered the parking areas; at East Lyme, Conn., shore roads were washed out; at Misquamicut and Weekapaug Beaches in Westerly, R. I., shore roads were under several feet of sand; at North Kingston, R. I., the bank and shore road were cut back; at Jamestown, R. I., houses were deposited on the road; and at Wareham, Falmouth, Barnstable, and Martha's Vineyard in Massachusetts shore and beach roads were either covered with sand and debris, or destroyed. In addition to such road damage, many bridges were seriously damaged, as for example the Nanquacket and Stone Bridges in Tiverton, R. I., and the Coggeshall Bridge in New Bedford, Mass.

47. *Shore protective structures.*—Damage to shore protective structures was comparatively moderate except at places such as Falmouth, Mass., where seawalls and bulkheads were destroyed or seriously damaged and backfill eroded, and Salem, Mass., where a heavy seawall was torn away at Hurley Point. In other instances, protective structures were overtopped and the property which they were designed to protect was seriously damaged, with little damage to the protective structure itself. Representative of the variety of minor damage to protective structures, most of which was incurred in Hurricane Carol, was the damage to stone groins at Hawks Nest Beach in Old Lyme, Conn.; damage to seawalls at Crescent Beach in East Lyme, Conn., at Narragansett, R. I., and in the Clark Grove area of New Bedford, Mass. Similar minor damage is exemplified by that to boulder revetment at Avery Point at Groton, Conn.; by erosion behind the seawall at Stonington Point, Conn., and by damages to timber groins at Buttonwoods in Warwick, R. I. Minor damages of this general nature were widely experienced along the coastal areas of Long Island, Connecticut, Rhode Island, and Massachusetts, as well as to a lesser extent in New Hampshire and Maine.

48. *Channel shoaling.*—Little accurate information is yet available as to the extent of shoaling caused by Hurricanes Carol and Edna, however, experience in the 1938 hurricane indicates that substantial shoaling may well have occurred in various navigation channels. Minor instances of shoaling known to have been caused by the 1954 hurricanes occurred at the Venetian Harbor entrance on the eastern shore of Connecticut, and in the Quonochontaug Inlet in the south shore of Rhode Island.

49. *Beach erosion.*—In some instances changes in the appearance of particular beaches resulting from Hurricane Carol were striking. Along the eastern portion of the south shore of Long Island, beaches were breached and large sections of dunes cut through. At Hammonasset Beach in Madison, Conn., the landward edge of the sand beach was reportedly extended about 40 feet inland over the marsh with an average depth of sand of 1 foot. In general, however, erosion of beaches resulting from wave attack was moderate. Along the Massachusetts shore, wave attack occurred generally at a higher level than the berms of beaches, with consequent erosion of bluffs, cliffs, and sand dunes rather than of the beaches themselves. Even in those areas receiving the brunt of Hurricane Carol's attack, specifically those areas extending westward from Chatham, along Nantucket and Vineyard Sounds, Buzzards Bay, Narragansett Bay, Block Island Sound, Fishers Island Sound, and Long Island Sound, erosion of beaches was not generally severe. Minor erosion, or accretion, occurred at a variety of localities. Representative of erosion was that of the sound end of Crescent Beach in East Lyme, Conn., and the accretion of Black Point Beach. At Napatree Beach, in Westerly, R. I., there was a substantial movement of beach sand landward. More common, however, was the erosion of areas normally beyond the reach of wave attack. Heavy erosion along Cliff Walk in Newport, R. I., ripped away huge unprotected sections of the walk. The erosion of dunes and the movement of large quantities of sand landward at Horseneck Beach in Westport, Mass., was also reported.

50. *Works under construction.*—Extensive public works were under construction in New England. Public highways were being built in unprecedented volume, military construction was at a high level, and public buildings, particularly schools, were being erected in many communities. With great activity in public construction, it might have been expected that the intense winds and precipitation which occurred during the 1954 hurricanes would have caused much damage. The damage surveys conducted by Federal, State and municipal authorities did not, however, reveal the existence of any large amount of damage to works under construction. Except for isolated damages, such as washouts of embankments, minor damage to buildings and bridges under construction, and lost time, it appears that damage to works under construction was relatively minor. No separate estimates covering this type of damage are available.

51. *Estimates of damage.*—Estimates of damages to public property for New England are given in table 85. Damage to public property on Long Island, N. Y., resulting from Hurricane Carol amounted to an estimated $524,000 and from Hurricane Edna, $175,000. In addition, beaches and beach protective structures some of them public property, were seriously damaged by Hurricane Carol and to a lesser degree by Hurricane Edna. Total damages to beaches and beach protective structures attributable to Carol amounted to an estimated $475,000 and to Edna $80,000. In north-central and western New York State, damages to municipal property and to public highways and parks attributable to Hurricane Hazel have been estimated at $849,200.

TABLE 85.—*Summary of hurricane damages to public properties in New England, 1954, New England-New York region*

HURRICANE CAROL

Location	Buildings	Bridges and highways		Seawalls, breakwaters and channels	Other public [2]	Total
		Town [1]	State			
Connecticut	$26,000	$439,000	$180,000	$487,000	$2,247,000	$3,379,000
Rhode Island	588,000	1,258,000	724,000	540,000	7,634,000	10,744,000
Massachusetts	328,000	2,568,000	3,143,000	389,000	22,191,000	28,619,000
New Hampshire	39,000	77,000	375,000		353,000	844,000
Maine	95,000	1,000	132,000	15,000	340,000	583,000
Total	1,076,000	4,343,000	4,554,000	1,431,000	32,765,000	44,169,000

HURRICANE EDNA

Connecticut	$4,000	$100,000	$45,000		$556,000	$705,000
Rhode Island	58,000	242,000	80,000		519,000	899,000
Massachusetts	22,000	406,000			529,000	957,000
New Hampshire	1,000		300,000		83,000	384,000
Maine		2,419,000	1,628,000		1,113,000	5,160,000
Total	85,000	3,167,000	2,053,000		2,800,000	8,105,000
Grand total						52,274,000

[1] Damage totals except for Massachusetts and Maine include damage only to town highways located in coastal communities.

[2] Includes all estimates of damage which could not be segregated by specific item, and cost of cleanup and damage to military installations.

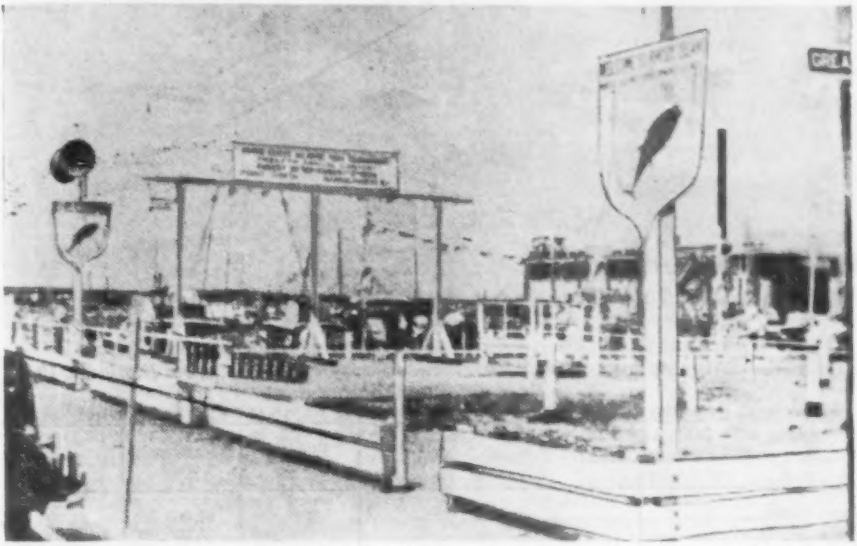
52. *Shipping.*—Damages coincident with recent hurricanes have been particularly severe to fishing vessels, other commercial vessels, recreational craft and shore facilities servicing these craft along the southern coast of New England and the Long Island shores. Losses by fishing vessels and recreational craft have been especially heavy.

53. *Commercial vessels.*—Hurricanes Carol and Edna caused an estimated loss of over $2½ million in New England and Long Island to commercial vessels. About 140 vessels were wrecked and 455 damaged, in New England waters Most of this damage was suffered by fishing vessels. In Massachusetts alone the loss amounted to about a million dollars with nearly half of this suffered by the fishing fleet at the port of New Bedford. In all, some 32 vessels were damaged at New Bedford to the extent of $495,000 with the estimated losses ranging from $2,000 to $40,000 per vessel. Commercial vessels in Rhode Island, mostly fishing vessels, suffered losses totaling about $650,000. Losses were incurred by large trawlers and numerous smaller vessels. Damages to commercial vessels in Connecticut totaled about $390,000. Some $250,000 of the total occurred at Stonington, Conn., which is the home port for 80 percent of the fishing fleet in Connecticut. At Stonington, 3 vessels were sunk, one being a total loss, 16 were washed ashore, 3 were floating and out of commission, and 2 required dry-docking for repairs. In Maine damages to commercial vessels amounted to about $450,000. A large percentage of this loss was suffered by the fishing fleet, small lobster boats and other small fishing craft. The smallest losses in New England waters were incurred by fishing vessels in New Hampshire where the total loss was estimated to be $65,000. Much of this damage occurred in the ports of Hampton, Seabrook, Rye, and New Castle. Damages to commercial vessels in Long Island waters amounted to an estimated $54,000 from Hurricane Carol and $3,000 from Hurricane Edna.

54. *Small craft.*—Recreational craft suffered extremely heavy losses during Hurricanes Carol and Edna at many points along the southern shores of New England particularly in the Narragansett Bay as a result of Hurricane Carol. It is estimated that over 750 pleasure craft were wrecked and more than 3,000 damaged. The value of these losses is an estimated $9,900,000. Many craft were driven ashore, swamped, and pounded against the bridges and wharves. More than half of the United States Atlantic tuna tournament fleet was sunk or damaged at Gallilee, R. I. Shore facilities such as piers, boathouses, yacht clubs, and similar structures also received great damage, some being smashed

beyond repair. In Long Island waters pleasure craft suffered damages estimated at $281,000 from Hurricane Carol and $88,000 from Hurricane Edna.

55. The estimated damage in New England waters to shipping by political subdivision and class is given in table 86. Included in the overall estimates are damages to private and commercial shore installations. No attempt has been made to give individual damage figures for Hurricanes Carol and Edna, but it is generally acknowledged that Hurricane Carol caused the most severe losses to shipping. Damages to commercial vessels which may have been caused by Hurricane Hazel have not been reported to the Committee. It is reported that Hurricane Hazel damaged over 100 small craft in western Long Island waters, but the monetary loss is not known.



Before: Assembly for 1954 U. S. Atlantic Tuna Tournament at Narragansett, R. I.

During: Boats riding at or above level of pier and autos awash.

62536—55——9

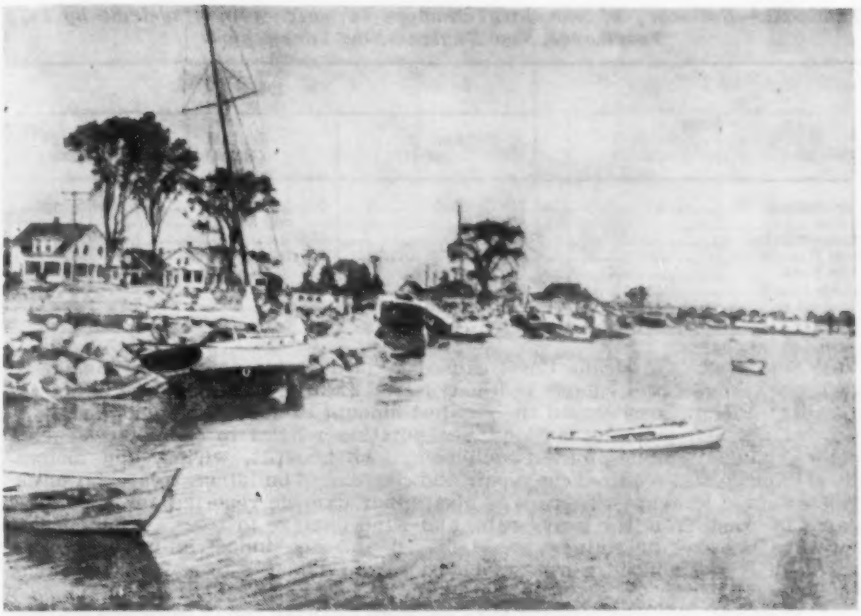
After: Wrecked Tuna Tournament craft. Hurricane Carol. New England-New York region.

TABLE 86.—*Shipping losses from Hurricanes Carol and Edna, New England, 1954, New England-New York region*

Location	Fishing vessels	Recreational craft	Total
Connecticut	$390,000	$1,000,000	$1,390,000
Rhode Island	650,000	5,000,000	5,650,000
Massachusetts	1,000,000	3,000,000	4,000,000
New Hampshire	65,000	150,000	215,000
Maine	450,000	750,000	1,200,000
Total	2,555,000	9,900,000	12,455,000

56. *Utilities.*—Utilities suffered varying degrees of damage from recent hurricanes. The following paragraphs set forth the effects of these hurricanes on water supply, sewerage, electric power, and communications systems. Utility damages are summarized in table 89b.

57. *Water systems.*—On August 31, 1954, Hurricane Carol caused a large amount of damage to water systems, particularly in Rhode Island and eastern Massachusetts, although the number of systems and the monetary loss were not so large as during the 1938 hurricane. Losses were similar to those of 1938 and involved power losses, requirements for emergency equipment, tree damage, breakage of mains at river crossings, washouts of mains and service lines, contamination of water supplies by salt water, and damage to buildings and equipment such as meters, electrical controls, and motors and pumps.



Damaged recreational craft, Scituate Harbor, Mass. Hurricane Carol. New England-New York region.

58. Massachusetts reported the largest damage to water systems from Hurricane Carol. A total of 27 water systems reported damage and the total loss was estimated to be $195,000. In Rhode Island 7 water systems were reported damaged and the loss was approximately $78,000. In Connecticut no damages to water-supply systems were reported to the Department of Health and since this agency usually is informed when such damages occur it is assumed that the damage and dollar loss were minor. In Maine the only damage reported was at Belfast where less than $500 was expended for reservoir restoration. Other than temporary power failure in three communities, the only damage in New Hampshire occurred at Lancaster where the intake dam was washed out. Repairs to the dam and disinfection of the reservoir cost a reported $5,000. Vermont and New York (within the New England-New York region) reported no losses to water-supply systems from the August 31 hurricane.

59. Massachusetts was the only State reporting damages to water-supply systems from Hurricane Edna (September 11, 1954). Six water-supply systems in eastern Massachusetts reported damages, mostly due to power loss, although in one instance silt entering the reservoir caused partial clogging of slow sand filters, and at another the tubular-well field was flooded. The total monetary loss, mostly for emergency and extra labor, was estimated by the State Department of Public Health as probably not in excess of $3,000.

60. None of the States reported any direct loss as a result of Hurricane Hazel which occurred on October 16, 1954. In New York, a number of water-supply systems suffered a temporary loss of power and had to resort to the use of auxiliary equipment. Where auxiliary equipment was not available storage capacities were adequate to avoid serious drops in water pressure. Table 87 summarizes the monetary loss to water-supply systems caused by the hurricanes of 1954.

TABLE 87.—*Summary of monetary damages to water supply systems by 1954 hurricanes, New England-New York region*

State	1954		
	Aug. 31 (Carol)	Sept. 11 (Edna)	Oct. 16 (Hazel)
Connecticut	No damage	No damage	No damage.
Maine	$500	do	Do.
Massachusetts	$195,000	$3,000	Do.
New Hampshire	$5,000	No damage	Do.
New York	No damage	do	Do.
Rhode Island	$78,000	do	Do.
Vermont	No damage	do	Do.

61. *Sewerage.*—Hurricane Carol caused a considerable amount of damage to sewerage systems, particularly in Rhode Island and the Cape Cod area in Massachusetts. Floodwaters caused the greatest amount of damage by flooding treatment plants and pumping stations, necessitating repairs to or replacement of motors, pumps, engines, other equipment, switchboards, wiring, and meters. Flood damage also required the repair and cleaning of buildings, treatment units, and sewerage systems. There was also minor damage reported for treatment plants by wash from the heavy rain, and wind damage to trees. A number of sewerage systems in Maine were damaged and one industrial-waste storage lagoon in New Hampshire was washed out. No damages to sewerage systems were reported from Connecticut, Vermont, or New York.

62. Monetary damages totaling $215,200 were reported for 12 sewerage systems in Rhode Island, most of which occurred at the East Providence sewage-treatment plant. Five sewerage systems in Massachusetts reported a total estimated damage of $153,900, and a number of others reported minor damage only which probably did not exceed a total dollar loss of more than $5,000. Reports on monetary damage to sewerage systems in Maine did not specify which of the 1954 hurricanes caused the loss, but the Maine Department of Health and Welfare reports that the most damage occurred during the September 11 hurricane. On this basis, it is estimated that damage to sewerage systems in Maine during Hurricane Carol probably did not exceed $10,000. The loss resulting from the washout of the industrial-waste storage lagoon in New Hampshire was reported to be $35,000.

63. Maine and Massachusetts were the only 2 States reporting damages to sewerage systems from Hurricane Edna, September 11, 1954. In Massachusetts there was minor damage from heavy rains by flooding sewerage systems and treatment works, and the State department of public health estimates that the total loss in all communities probably did not exceed $2,000. In Maine, where one center of the storm struck, damage to sewerage systems was more severe, including broken sewer lines, collapse of trunk sewers, washouts, damage to outfall sewers by wave action, and the clogging and filling of a large number of sewers and catch basins by silt and debris. A total of 32 communities reported damages to sewerage systems from Hurricanes Carol and Edna, most of which were damaged by the latter. A total monetary loss of $92,800 was reported for the 2 hurricanes, of which it is estimated that approximately $82,800 was caused by Hurricane Edna on September 11.

64. None of the States reported damages to sewerage systems from Hurricane Hazel, October 16, 1954. A number of treatment plants in New York had a temporary loss of power which probably did not result in any direct monetary loss. Table 88 summarizes the monetary loss to sewerage systems caused by the hurricanes of 1954.

TABLE 88.—*Summary of monetary damages to sewerage systems by 1954 hurricanes, New England-New York region*

State	1954		
	Aug. 31 (Carol)	Sept. 11 (Edna)	Oct. 16 (Hazel)
Connecticut	Negligible	No damage	No damage.
Maine	$10,000 [1]	$82,800 [1]	Do.
Massachusetts	$153,900	$2,000 [2]	Do.
New Hampshire	$35,000	No damage	Do.
New York	No damage	do	Do.
Rhode Island	$215,200	do	Do.
Vermont	No damage	do	Do.

[1] A total loss of $92,800 was reported for the 2 hurricanes of Aug. 31 and Sept. 11, most of which was caused by the latter.
[2] No individual reports available, but estimated by the Department of Public Health not to exceed this amount.

65. *Communication utilities.*—The greatest damage to communication utilities occurred to the two major New England telephone companies and their subsidiaries during Hurricanes Carol and Edna. Some 250,000 telephones were reported out of service in Massachusetts, Rhode Island, New Hampshire, and Maine. By far the preponderant part of the damage was caused to poles and lines. In north-central and western New York State, Hurricane Hazel caused damages to communication utilities totaling an estimated $160,000. Customers affected by loss of telephone service numbered 32,900. About half of this damage occurred in the area of north-central New York centered on Syracuse.

66. *Power utilities.*—It is estimated that damage to utility generating plants and transmission and distribution facilities in New England and New York State [2] were in excess of $14 million and that during the three 1954 hurricanes, almost 4 million customers were affected. Following Hurricanes Carol and Edna, restoration to service in the coastal areas varied from 1 to 10 days, while that following Hazel required 1 to 5 days. The location and routing of essential equipment and material to repair or replace damaged facilities taxed the combined efforts of utilities, manufacturers, jobbers, and transportation channels.

67. The principal utilities affected by Hurricanes Carol and Edna were those in the coastal areas of New England and New York. Eighteen utilities in New England and four in New York State furnished data on damages from the three hurricanes.

(*a*) *New England.*—The 18 utilities, which furnished data on Hurricanes Carol and Edna, including the few affected by both these storms and also Hurricane Hazel, provide almost 90 percent of the peak load requirements of New England.

(*b*) *New York.*—The four utilities which furnished data on damages incurred in the 1954 hurricanes supply over 90 percent of the peak load requirements of New York State.

67a. Analysis of the damage incurred in Hurricanes Carol and Edna indicates that generating stations were affected in only a few instances. Transmission lines were affected to only a moderate degree in heavily struck areas. However, distribution circuits suffered heavily and it is estimated that over 85 percent of total damages and outages resulted from failure in this branch of utility plant. Some of the very large utilities were unable to break down accurately total dollar damages between Hurricanes Carol and Edna inasmuch as the latter followed so closely upon the former that repairs, and in many instances surveys of affected equipment, had not been completed before essentially the same work had to be carried out again.

(*a*) *New England.*—Total reported dollar damages sustained by the 18 New England utilities as a result of the 3 storms aggregated approximately $10,650,000. Although Hurricane Edna caused in some instances more damage than Carol, particularly in parts of the State of Maine, the greatest outage of service to consumers and the maximum loss of load for the entire group of

[2] Includes portion of New York outside New England-New York region.

18 utilities occurred immediately after Carol had passed through. This storm shut off about 1,750,000 customers aggregating nearly 1,760,000 kilowatts of noncoincident load. It is estimated that between 4,500 and 5,000 distribution system poles required replacement or repair in New England due to Carol and about 2,000 to 2,500 to Edna. The total dollar damage and estimated customers affected with an estimate of the load dropped by States for the three hurricanes is shown in table 89.

TABLE 89.—*Direct damages, customers affected, and load dropped, 1954 hurricanes (18 utilities solicited comprising 90 percent of New England load), New England-New York region*

State	Estimated direct damages [1]	Estimated customers affected	Estimated load dropped
		Number	*Kilowatts*
HURRICANE CAROL			
Connecticut	$475,500	213,000	332,000
Rhode Island	1,119,400	258,000	321,000
Massachusetts	5,359,600	958,000	800,000
New Hampshire	658,500	115,000	95,000
Maine	720,000	210,000	207,000
HURRICANE EDNA			
Connecticut	$198,000	116,000	89,000
Rhode Island	251,600	101,000	102,000
Massachusetts	1,237,400	483,000	375,000
New Hampshire	151,500	36,000	31,000
Maine	380,000	145,000	138,000
HURRICANE HAZEL			
Connecticut	$98,100	50,500	53,000
Total	10,649,600	2,694,500	2,563,000

[1] Indirect losses (power production and customer losses) estimated to be about $5,324,800.

(*b*) *New York.*—Total reported damages sustained by the four New York utilities as a result of 1954 hurricanes aggregated approximately $3,560,000. Although the hurricanes Carol and Edna affected principally Long Island, the metropolitan area of New York City, Hurricane Hazel caused considerable trouble in this area and in west central New York State. The maximum consumer outage for the area served by the 4 utilities occurred with Hurricane Hazel when 720,000 customers were cut off and about 600,000 kilowatts of noncoincident load. In New York the total number of distribution poles damaged or replaced was of the order of 350 to 400 in Carol, 250 to 300 in Edna, and 850 to 1,000 in Hazel. Estimates of total dollar damage and customers cut off for the three hurricanes with an estimate of the load lost are shown in table 89a.

TABLE 89a.—*Direct damages, customers affected, and load dropped, 1954 hurricanes (4 utilities solicited comprising over 90 percent of New York load), New England-New York region*

State	Estimated direct damages [1]	Estimated customers affected	Estimated load dropped
		Number	*Kilowatts*
Hurricane Carol: New York	$1,395,000	375,000	425,000
Hurricane Edna: New York	544,000	132,500	170,000
Hurricane Hazel: New York	1,620,000	720,000	600,000
Total	3,559,000	1,227,500	1,195,000

[1] Indirect losses (power production and customer losses) estimated to be about $1,779,500.

TABLE 89b.—*Hurricane damages to utilities in coastal communities of New England, 1954, New England-New York region*

Location	Municipal utilities	Communication facilities	Private power plants and transmission [1]	Total
HURRICANE CAROL				
Connecticut	$115,000	$638,000	$713,250	$1,466,250
Rhode Island	259,000	1,200,000	1,679,100	3,138,100
Massachusetts	492,000	5,100,000	8,039,400	13,631,400
New Hampshire		675,000	987,750	1,662,750
Maine	20,000	900,000	1,080,000	2,000,000
Subtotal	886,000	8,513,000	12,499,500	21,898,500
HURRICANE EDNA				
Connecticut	$8,000	$360,000	$297,000	$665,000
Rhode Island	33,000	1,200,000	377,400	1,610,400
Massachusetts	40,000	5,100,000	1,856,100	6,996,100
New Hampshire		675,000	227,250	902,250
Maine	6,000	900,000	570,000	1,476,000
Subtotal	87,000	8,335,000	3,327,750	11,649,750
HURRICANE HAZEL				
Connecticut			$147,150	$147,150
Total	$973,000	$16,748,000	15,974,400	33,695,400

[1] Includes estimates of direct and indirect damage for both coastal and interior areas.

68. *Transportation facilities.*—Transportation facilities suffered from the effects of 1954 hurricanes. The railroads were particularly hard hit suffering total damages of more than $2,500,000, with $1,995,000 in New England and the remainder in New York State. Washouts, loss of communication and switching, and damages to bridges and culverts, were heavy for the coastal lines. Some branch lines remained out of service for extended periods but in general, main lines were operating normally in less than 1 week. Airlines suffered approximately $300,000 damage from Hurricane Carol. This damage was principally to ground installations and aircraft. Loss of income, added personnel, and operation costs accounted for only 25 percent of the total. Bus companies suffered relatively minor direct damages, most of their loss being due to loss of patronage. Damages to railroad facilities in New England by State are given in table 90.

TABLE 90.—*Damages to railroad facilities in New England from 1954 hurricanes, New England-New York region* [1]

Location	Hurricane Carol	Hurricane Edna	Total
Connecticut	$300,000	$15,000	$315,000
Rhode Island	525,000	15,000	540,000
Massachusetts	206,000	185,000	391,000
New Hampshire	69,000	40,000	109,000
Maine	58,000	582,000	640,000
Total	1,158,000	837,000	1,995,000

[1] Central Vermont RR. not included.

69. It is notable that the greatest damage to railroads occurred in Maine during and following hurricane Edna. This damage resulted largely from washouts induced by the heavy precipitation which occurred in Maine at the time of this storm.

70. *Military installations.*—Military installations located in southern New England suffered heavily, principally those which were subjected to tidal flooding. Others suffered relatively minor damage such as loss of roofing, washout of roads, and erosion of runways. The Navy and Air Force were well prepared for the storms and utilized their own forecast alert to send ships to sea and to remove aircraft to fields outside the damage area prior to the storm. Damages to military installations in New England are included in the estimates of public damage given in table 85.

71. *Commercial installations.*—Damages to comercial installations include damage to the service industries: warehouses, stores, restaurants, banks, and office buildings. Great damage to these installations occurred from the tidal flooding occasioned by hurricane Carol. By far the largest loss occurred in the Providence, R. I., area as tidal waters overflowed the commercial center of the city. Cleanup of the city following hurricane Carol involved the destruction of about 500,000 cases of canned goods, 48 freight carloads of fruit and produce, prescription drugs and medicines valued at $300,000, 500,000 pounds of flour, 100,000 pounds of meat, 40,000 pounds of fish, 5,000 cases of malt beverage, 15,000 cases of carbonated beverages, and 2,500 cases of liquor spirits. In addition, stocks of shoes, dry goods, furniture, and other items were severely damaged or rendered worthless by the salt water. Substantial damages occurred to commercial establishments in other localities, the greater part of the damage being attributed to tidal flooding.

72. The estimated damage to commercial installations in New England by political subdivision and by storm is given in table 91.

TABLE 91.—*Damages to commercial installations in New England from hurricanes, 1954, New England-New York region* [1]

Location	Hurricane Carol	Hurricane Edna	Total
Connecticut	$2,752,500	$489,000	$3,241,500
Rhode Island	44,589,000	941,000	45,530,000
Massachusetts	5,063,000	539,000	5,602,000
New Hampshire	280,000		280,000
Maine	317,000	197,000	514,000
Total	53,001,500	2,166,000	55,167,500

[1] Includes damages to commercial properties situated in coastal communities only.

73. Of the above commercial damages suffered during the two storms, $39,652,000 occurred within the city of Providence, R. I., $1,545,000 at Newport, R. I., $1,500,000 at New Bedford, Mass., and $1,359,000 at New London, Conn. Thus, these four cities account for about 77 percent of the total commercial loss occasioned by these storms in coastal areas of the region.

74. Commercial installations and industrial plants along shore areas in Long Island, N. Y., were also hit severely by wind and water accompanying 1954 hurricanes especially hurricane Carol, which produced damages to these commercial installations of an estimated $909,000. Hurricane Edna caused damages amounting to $30,000. Estimates of commercial damage in the remainder of the New York State portion of the region from hurricane Hazel are not available at this time.

75. *Industrial property.*—Some of the areas along the southern coast of New England are highly developed for industrial purposes. Manufacturing plants are concentrated in Stamford, Bridgeport, New Haven, Norwalk, and Stonington in Connecticut, Westerly, and Providence, R. I., and Fall River and New Bedford in Massachusetts. Those facilities situated adjacent to tidal waters suffered tremendous losses particularly in the area east of New London. By far the greatest concentration of damage occurred in Providence, R. I., New Bedford, Mass., and adjacent areas. These areas were also among those where the tidal heights (above mean high water) were the greatest. Damages to industrial plants in coastal areas of New England by States, are given in table 92 separately for each storm.

TABLE 92.—*Hurricane damages to industrial plants in New England, 1954, New England-New York region*[1]

Location	Hurricane Carol	Hurricane Edna	Total
Connecticut	$5,339,000	$205,000	$5,544,000
Rhode Island	13,938,000	591,000	14,529,000
Massachusetts	16,958,500	867,000	17,825,500
New Hampshire	99,000	21,000	120,000
Maine	32,000	24,000	56,000
Total	36,366,500	1,708,000	38,074,500

[1] Includes damages to industries situated in coastal communities only.

76. Seventy percent of the total industrial loss in coastal areas amounting to over $27 million occurred in the Providence, R. I., and the New Bedford, Mass., areas. These losses were predominantly due to tidal flooding with almost 90 percent of the industrial damage in these two areas being attributed to this cause alone.

77. *Agricultural damages.*—Agricultural damages, while generally not as severe as other classes of damage, were experienced in varying degree throughout the New England-New York region. Agricultural damages sustained in the State of Maine from Hurricanes Carol and Edna amounted to an estimated $10 million. Losses in Massachusetts from the same two storms, largely from destruction of crops, amounted to $6,840,000. The loss in New York State from 1954 hurricanes was estimated to be $5,104,000, primarily in damages to farm buildings. Total damages for the region amounted to an estimated $29,285,100. Table 93 summarizes 1954 hurricane damages throughout the region by type of damage for each State. The classes of agricultural damage resulting from hurricanes are as follows:

(*a*) *Homes and buildings.*—For the most part, damages were confined to roofs and structurally weak buildings. An exception was the loss of poultry houses which were bodily removed. A number of silos were blown over or put out of use. In most instances of silo loss the structures were weak and the hurricane simply speeded up the task of replacement. Entire buildings were removed in some areas, particularly in Rhode Island and a few other hard-hit sections.

(*b*) *Machinery.*—Relatively little damage to machines was reported. This would be expected in view of the relatively minor building damage, and the few buildings entirely destroyed.

(*c*) *Orchards.*—Damage to the 1954 apple crop was heavy, up to 65 percent of apples on the tree (most McIntosh variety) being blown to the ground. Relatively few of the windblown apples could be sold as grade 1 fruit. Also, a small percentage was too immature for any use. Most of the remaining windblown apples were sold for local use or were converted into cider. Efforts of the local food stores to market the apples were very successful, and were a very important factor in keeping losses to a minimum. Apples remaining on the trees suffered some damage from winds, but many of them made additional growth and produced a higher than average proportion of grade 1 fruit. Relatively few trees were blown down or destroyed.

(*d*) *Tobacco.*—Damage to unharvested tobacco in Massachusetts and Connecticut was high. About 10 percent of the open field crop had not been harvested at hurricane time, and about half of this was completely lost. Losses to shade tobacco growers in Connecticut were heavy. About 15 percent of the crop was not harvested at time of hurricane, and at least half of this was left valueless. Most of the shade tobacco cloth had no salvage value because of tearing. Comment from the field was that the tobacco cloth in 1954 was of poorer quality than usual, and doubt was expressed whether the cloth would have had any salvage even without hurricane damage.

(*e*) *Other crops.*—Heavy rains in connection with the hurricanes caused some delay in harvesting operations because of wet land conditions. They also contributed to spread and increase in severity of late potato blight. Washing of soil uncovered significant quantities of potatoes, leaving them exposed to the sun, which resulted in loss of salability. Extra costs for harvesting silage corn were cited because the corn was partially blown down, and in more than one direction. There was considerable loss of quality in the late sweet corn crop

in Maine, and a portion of the crop was considered unfit to harvest. Growing conditions prior to the hurricane had been relatively unfavorable, and the quality of the crop was definitely below average. Detailed costs representing the above crop items and factors are not available. It is apparent, however, that the direct and indirect damages and costs were of considerable magnitude.

(*f*) *Livestock and fowl.*—Losses of livestock, except poultry, were of small consequence. In several instances poultry houses were blown away. When this happened, birds were killed immediately or were scattered or lost. Some recovery was possible. Highway conditions resulting from heavy rains in the State of Maine prevented hauling of poultry food and the regular marketing of eggs and broilers.

(*g*) *Forests and lumber.*—In general, there was less timber blown down than in the 1938 hurricane. Local exceptions to this occurred, however, and in many locations salvage operations were given first priority. Blown timber is reported to be worth some $4 per thousand board feet less than standing timber, and the damage estimates were made on that basis. Blown-down of all types of trees created a removal problem on fire-access roads.

TABLE 93.—*Summary of agricultural damages from 1954 hurricanes, New England-New York region*

State	Type of damage						
	Buildings	Equipment	Crops	Livestock	Timber [1]	Other	Total
Maine							$10,000,000
New Hampshire [2]	$1,568,500	$11,000	$566,300	$29,500	$186,500	$106,500	2,468,300
Vermont	100,000						100,000
Massachusetts	1,100,000		5,500,000		240,000		6,840,000
Rhode Island	716,100	29,800	1,133,800	32,100			1,911,800
Connecticut		20,000	2,841,000				2,861,000
New York	4,605,500	99,500	173,000	124,000	102,000		5,104,000
Total	8,090,100	160,300	10,214,100	185,600	528,500	106,500	29,285,100

[1] Represents net loss figures based on salvagable values.
[2] No damages reported from Carroll, Cheshire, and Coos Counties.

78. *Foodstuffs.*—Hurricane Carol was responsible for a dollar loss of foodstuffs of approximately $6,700,000. This resulted largely from tidal flooding and loss of power at food establishments and private homes with the largest losses being incurred at Providence and other waterfront areas in Rhode Island. In all, 2,323 food establishments of all categories in Rhode Island were reported to have suffered loss of foodstuffs by spoilage or contamination with a total dollar loss of $3,145,825. In addition to losses at food establishments, it was estimated that approximately $2 million worth of food in private homes was lost due to extended power failure, most by spoilage of frozen foods stored in home freezers. In Massachusetts hurricane damages to foodstuffs were confined principally to the eastern part of the State, with most occurring in the Cape Cod area. Approximately 1,500 food estabishments in Massachusetts lost foodstuffs having a dollar value estimated to be $1,200,000. The value of foods lost in homes due to power failure probably did not exceed $100,000.

79. In Connecticut the greatest damage to foodstuffs was caused to food establishments in those areas bordering the waterfront from Branford east to the State line, with the greatest damage occurring in the New London-Groton-Stonington area. It is estimated that 100 food establishments in Connecticut lost foods from hurricane damage that had a dollar value of approximately $250,000. Maine and New Hampshire had little loss of foods due to Hurricane Carol. The value of foods lost was $5,000 in each State. Most of this loss was caused by damage to food in homes due to temporary power failure. Damage to foodstuffs in Vermont was reported to be insufficient to note.

80. Foodstuff losses in the New England-New York region caused by Hurricanes Edna and Hazel were reported to be negligible.

81. *Drug establishments.*—Drug establishments suffered a large loss from damages to medicines and related products caused by Hurricane Carol. Damage to drug establishments was greatest in Rhode Island, where a total of 26 establishments of all types (retail, wholesale, and manufacturing) reported losses, 16 of these establishments being in Providence. The total dollar loss to drug

establishments in Rhode Island was reported to be $323,000. In Massachusetts 8 drug establishments, mostly on Cape Cod, reported losses estimated at $200,000 from damages caused by Hurricane Carol. Along the waterfront in eastern Connecticut 6 drug establishments reported hurricane damages to stocks that resulted in a dollar loss estimated not to have exceeded $50,000. In all the other States in the region the damages to drug establishments by Hurricane Carol were reported to be very minor.

82. Losses to drug establishments caused by the Hurricanes Edna and Hazel were reported to be negligible.

83. *Fisheries and wildlife.*—In addition to the damages to fishing vessels, the fishing industry suffered a severe blow through the destruction of docks, buildings, plants, nets, traps, pots, and other gear. The loss of stocks of fish and shellfish on hand and the unemployment of both men and equipment also resulted in great economic losses to the industry.

84. In Rhode Island the most serious damage resulted from the temporary loss of the Point Judith Fisherman's Cooperative dehydrating plant. Damages to buildings and equipment plus the losses of wages and profits during the period the plant was out of operation totaled more than $300,000. The Shellfish Co. at Wickford suffered an estimated loss of $60,000. The pound-net fishery of Rhode Island was completely wiped out with an estimated loss of $90,000. The lobster fishery lost an estimated $48,500 in pots, lines, and gear. A similar loss to the shellfishery was placed at about $14,200. The losses to the commercial fishery in Rhode Island totaled $830,400.

85. In Provincetown, Mass., the traps or pound nets were more extensively damaged than traps or pound nets in any other port in the State. Twenty-five nets with a total estimated value of $107,000 were lost. Eight nets at North Truro and one net at Sandwich were destroyed. These nets were estimated to be worth about $31,000. In addition, the loss resulting from these traps being out of water was estimated to be $20,000 per week for the months of September and October.

86. At New Bedford, six dealers suffered from abnormally high tides resulting in destruction to their shore establishments. In addition three marine railways suffered considerable damage. The total estimated damage in New Bedford was $311,000. The production loss in this port was estimated at $11,600. The total fishing damages in Massachusetts, not including damages to fishing vessels, were estimated at $769,000.

87. In Connecticut, damages to commercial fishing gear and nets were estimated to total over $157,500. No data are available as to losses caused by unemployment of boats, gear, and fishermen.

88. Damages to fishing gear in Maine were extremely heavy. According to the estimates, Hurricane Carol caused a loss of $770,000 to traps and weirs, a loss of $100,000 in live lobsters which were stored awaiting shipment, and $30,000 in damages to miscellaneous items. Hurricane Edna which struck the eastern section of the coast, caused damages estimated at $900,000 to traps, weirs and other gear. The loss of live, stored lobsters was estimated at $100,000 and miscellaneous damages, largely the result of heavy rains, were estimated at $50,000. Total losses in Maine were over $2 million.

89. In New Hampshire, the loss in traps and other gear was estimated at $30,000. This represents about 25 percent of the total of all commercial fishing gear in the State.

90. No data are available as to the effects of hurricanes on fish stocks or the fishing grounds. All indications are, however, that little if any damage occurred.

91. There was little overall loss to shellfish areas as a result of the hurricanes. Disruption of sewerage systems during Hurricane Carol in Rhode Island resulted in the closure of a total of 11,000 acres of shellfish beds for periods of 3 to 5 weeks. Disruption of a pumping station at New Bedford, Mass., caused the overflow of raw sewage which resulted in the closure of another shellfish area. Localized areas, where bottom conditions allowed sand to be washed readily, suffered some damage but the totals, both acreages and losses, are unknown. Considerable destruction of bay scallops, both seed and adult, occurred in the area at the head of Buzzards Bay in Massachusetts. Damage was also reported to oyster and quahog grants in the same general area and in the town of Falmouth. The estimated total losses in both areas would exceed $75,000.

92. Of some importance in regard to the fisheries was the effect of hurricanes on the activities allied with the commercial fisheries. The research activities of both State and Federal agencies were hampered and, in some cases, set back for a long period of time. Research facilities of the Fish and Wildlife

Service suffered estimated damages of over $5,000. No data are available for State marine facilities. The principal damage to inland fresh-water facilities was due to the floods accompanying the hurricanes, with lesser damage from winds.

93. The only data available in regard to State fish hatcheries are those reported in Maine. Eleven of these units were damaged to some extent, with the total loss estimated at $44,000. Extensive damage occurred to the boat liveries and charter and party boats which cater to the marine-sport fishermen. No total damage figures are available, but it is known that most of the boat liveries lost a good share of their rental boats, in 1 case 29 out of 30, and buildings and docks were extensively damaged. One case was noted where a bait and tackle shop was completely destroyed, with a total loss of over $15,000.

94. Hurricane damage to wildlife was not extensive. Although wildlife food supplies were damaged to a considerable extent, with up to 75 percent loss on the 5 national wildlife refuges in the region, no lasting effects were noted. Most of the damage to dams, dikes, roads, and trails on wildlife management areas was caused by floods. In addition, silting of aquatic foods was noted in such waterfowl concentration points as Merrymeeting Bay, Maine, and in Narragansett Bay, R. I. No estimate of total damages to wildlife is available at this time.

95. *Damage to private and personal property.*—The damage sustained by private and personal property in hurricanes is widespread, serious, and very difficult to estimate in its full extent. In innumerable cases such damage is probably sufficiently minor to escape being reported or being observed by investigators; and in other cases, as in the damage done to personal effects in the flooding of cellars, for example, it is impossible to evaluate losses in monetary terms. In general, major private property damage may be classified under three headings: that occurring to homes and fixtures, that occurring to automobiles, and that occurring to trees and shrubbery. Destruction of homes is greatest in coastal areas which are subject to tidal flooding, for in these areas large numbers of homes are completely demolished by the extreme tides, and many more inevitably suffer highly serious water damage, as well as damage from wind. In interior areas, however, probably few houses escaped some minor damage consisting of the loss of shingles, screens, porches, or other loosely attached fixtures. Similarly, damage to automobiles is overwhelmingly greatest in these areas subject to flooding, where large numbers of automobiles are inundated. In all areas, however, automobiles are vulnerable to flying debris and falling trees, suffering damages varying from minor dents to almost complete demolition. In all areas trees, shrubs, and other plants suffer severely. The high winds of hurricane force uproot thousands of trees, damage many more severely, and destroy shrubs and smaller plants.

96. Destruction of private property in Hurricane Carol was greatest in coastal areas subject to tidal flooding, and damage was greatest along the southern New England coast. The Narragansett Bay area in Rhode Island, and the coast of Massachusetts between Westport and the Cape Cod Canal, received the most concentrated damage. In some communities along the shorefront roads and cottages were almost totally destroyed for the second time in 16 years, having undergone similar destructive attack in 1938. In many shore areas automobiles suffered extensive damage from both wind-blown debris and water. Although less extensive in inland areas, damages were severe both to homes and to automobiles, and in both coastal and inland areas trees, shrubs, and plants suffered considerably from high winds.

97. The destruction of homes in hurricane Carol was staggering. Uncounted cottages and other structures were demolished by the accompanying flood with only piles of rubble left. Cottages nearest the water were generally smashed to pieces, or lifted bodily from their foundations and hurled against cottages to the rear. In some cases, the wind demolished buildings prior to the onslaught of the tidal flood. Further inland and beyond the reach of the tide, the wind ripped off screens, doors, roof coverings, shutters, and almost every other loose object. In all areas, either as a result of tidal flooding or to a lesser extent as a result of torrential rains, thousands of cellars were flooded with consequent damage to heating systems and to personal effects. Tidal flooding accounted for the greatest proportion of destruction. Even well-constructed houses were unable to withstand the force of the waves. Buildings situated in protected locations but within reach of the water suffered extreme damage as the salt water rose above floor level.

98. The extent and type of damage is indicated by the early reports of damage in Rhode Island, where 620 single homes were estimated to have been destroyed, 888 to have suffered major damages, and over 4,000 to have suffered minor damages. Similar early estimates in Massachusetts indicated almost 800 buildings destroyed, slightly more suffering major damages, and over 2,600 suffering minor damages. Representative of damage occurring to homes along the Connecticut coast is the extensive damage to trailers, tents, and other portable houses at Hammonasset Beach; destruction at Westbrook and Old Saybrook where the tide floated away some 20 to 30 cottages in each town; in East Lyme, where the sea ripped the fronts off a dozen houses, and tore off both front and rear of some others; and at Stonington where most of the 150 cottages were damaged, some 28 of them being demolished. In Rhode Island, where destruction was greatest, examples of the degree of damage were found at Misquamicut where in 2 miles of beach only 4 of 200 cottages remained upright; in South Kingston, where some 370 cottages were reported destroyed and between 1,000 and 1,100 damaged; at Narragansett, where 212 were destroyed and over 500 more damaged; and at Tiverton, where 4 homes were washed away and 50 more badly damaged. In Massachusetts, destruction was most staggering in the Buzzards Bay area. At Fairhaven, some 130 cottages and 35 homes were wrecked beyond repair and 200 or more were damaged, with the hardest hit areas being at Sconticut Neck and West Island. At Mattapoisett, 300 summer homes were reported demolished and 300 more seriously damaged. At Wareham, Bourne, and Falmouth likewise, destruction was exceptionally great, some 363 cottages being destroyed and 600 more damaged at Wareham alone.

99. As with other types of property, damage to motor vehicles was due principally to tidal flooding. Although a large number of automobiles were destroyed by falling trees, this was insignificant compared with the thousands of vehicles damaged or destroyed by tidal flooding. Hurricane Carol reached the coastal area of southern New England in the morning after most commuters had parked their automobiles. In Providence alone over 5,000 vehicles were reported to have been affected by tidal flooding. Many others suffered damage at other coastal cities and towns when they were trapped in tidal waters. No complete estimates of damage to motor vehicles are available.

100. Privately owned trees and shrubs suffered wind damage comparable to similar damage on publicly owned land, but estimates are far from being all-inclusive. Privately owned forest lands received extensive damage but no estimates of damage are included in the summary presented in table 94.

TABLE 94.—*Private property damage from 1954 hurricanes in New England, New England-New York region* [1]

Location	Hurricane Carol	Hurricane Edna	Total
Connecticut	$13,242,000	$2,687,000	$15,929,000
Rhode Island	13,913,000	1,616,000	15,529,000
Massachusetts	23,015,000	1,343,000	24,358,000
New Hampshire	954,000	22,000	976,000
Maine	580,000	217,000	797,000
Total	51,704,000	5,885,000	57,589,000

[1] Includes damages to private and personal property within coastal communities only.

101. Private property in coastal areas of Long Island, N. Y. also suffered large losses as a result of Hurricanes Carol and Edna. Hurricane Carol which caused damages to private property at an estimated $1,977,000 was particularly devastating. Residential property damage from Hurricane Edna amounted to about $104,000. Residential and commercial property damages in the New York State portion of the region resulting from Hurricane Hazel amounted to an estimated $2,140,000. More than 85 percent of these damages occurred in the north-central area of the State centered on Syracuse. Property damage in New England resulting from Hurricane Hazel was less than $100,000. Total damages on Long Island resulting from Hurricane Hazel were an estimated $125,000.

102. *Employment losses.*—The losses from unemployment in New England have been included where possible in the appropriate damage figures. Estimates by States of the employment time lost by workers as a result of Hurricanes Carol and Edna are as follows: 1,500 workers displaced for an average duration

of 16.2 days in Connecticut; 50,000 employees displaced for an average duration of 5 days in Rhode Island; 30,000 employees displaced for an average of 3 days in Massachusetts; 155,000 unemployed for a period of less than 1 day in New Hampshire; and 10,000 employees displaced for an average of 1½ days in Maine.

106. *Summary.*—The total hurricane damages in the region, as given in preceding paragraphs, are summarized by State and by storm in table 96. Estimates of damage for interior areas are incomplete.. Table 97 gives a summary of these damages by type of loss.

TABLE 97.—*Summary of 1954 hurricane damages by type of loss, New England-New York region*

Type	*Loss*
Public property	$53,822,200
Shipping	12,881,000
Utilities	39,193,900
Transportation	2,800,000
Commercial	55,167,500
Industrial	38,074,500
Agricultural	29,285,100
Foods and drugs	7,278,800
Fisheries	3,786,900
Private property	59,670,000
Other [1]	3,859,000
Total	305,818,900

[1] Inseparable combinations of 2 or more types of loss.

107. Several coastal communities suffered extensive damage from Hurricanes Carol and Edna but particularly from Hurricane Carol. Table 98 lists losses for seven New England communities resulting from Hurricanes Carol and Edna.

TABLE 98.—*Damage suffered in 7 communities in southern New England from Hurricanes Carol and Edna, New England-New York region*

Community	Carol	Edna	Total
Fairfield, Conn	$577,000		$577,000
New London, Conn	2,066,000	$843,000	2,909,000
Newport, R. I	2,670,000	121,000	2,791,000
Bristol, R. I	2,945,000	237,000	3,182,000
Providence, R. I	51,690,000	1,035,000	52,725,000
Assonet, Mass	508,000	16,000	524,000
New Bedford, Mass	15,220,000	1,130,000	16,350,000

The above community estimates are exclusive of any damage to State facilities, military installations, communications and power, that may have been incurred in these communities. Estimates for these excepted items did not permit segregation by locality.

PROTECTIVE POSSIBILITIES

139. *Warning service.*—The hurricane warning service of the United States Weather Bureau is designed to furnish advance warnings of hurricanes to the public generally. For the east coast and gulf areas the service is centered at Miami, Fla., with four associate warning centers at San Juan, Puerto Rico, New Orleans, La., Washington, D. C., and Boston, Mass. Certain geographical areas of responsibility have been established and the office responsible issues public advisories on each tropical storm (hurricane) located in its area of responsibility.

140. The center at Miami provides liaison with other Government departments, such as the Air Force and Navy. As a result there is excellent coordination in the official advisories released by Government agencies. Provisions are also made at Miami for the dispatch of military aircraft for storm reconnaissance.

141. Official public advisories are issued whenever a tropical storm is detected. The advisories are issued at intervals of 6 hours and are numbered consecutively for each storm. Wide distribution is given to the advisories. They are distributed by the news wire services, by radio, television, and newspaper, over

direct radio broadcasts from Weather Bureau offices and by official distributors such as Civil Defense, Red Cross, and State police.

142. In addition to the official advisories, information on the effects expected from the tropical storm is included in public forecasts issued for the areas likely to be affected. Weather Bureau offices issue bulletins for press and radio at other than the official advisory times in order to keep the public advised of the storm's progress.

143. Distribution from the Weather Bureau includes all news agencies in the area affected. In some cities local public weather circuits are operated which provide an excellent means for dissemination of full information on the storm's progress. Warnings such as advisories, bulletins, and public forecasts, are sent on these local circuits.

144. Coastal areas are covered by forecasts of expected conditions. Warnings are issued, as required, including storm warnings and hurricane warnings. Appropriate visual flag displays are made for these warnings to obtain distribution to shipping and boating interests.

145. Provisional storm or hurricane warnings (alerts) are issued whenever necessary to advise the public in advance regarding the possibility of dangerous storm conditions developing.

146. Despite the best efforts of the Weather Bureau, the news agencies and official distributors, there is a need for wider and more expeditious distribution of hurricane warnings and advisories. Steps are being proposed to improve this by cooperating in the establishment of additional public weather circuits, creation of local warning networks in collaboration with civil defense organizations, and setting up additional distributors for relay of warnings to the public.

147. More extensive use of preliminary hurricane alerts is being studied. In this connection an educational program to familiarize the public with the nature and frequency of hurricanes, existing warning services and protective measures would be very helpful. Efforts should be made to enlist the aid of other groups in furthering the aims of such an educational program.

148. Modern radar equipment operating on a radio frequency of about 2800 megacycles with a peak power output of about a million watts, would be of great assistance in detecting and tracking hurricanes that affect the east coast of the United States. It would contribute very importantly to the timeliness and effectiveness of the Weather Bureau's hurricane warning service. Installations at Eastport, Maine; Nantucket, Mass.; Atlantic City, N. J.; Hatteras, N. C.; Charleston, S. C.; and Daytona Beach and Miami, Fla., would enable the precise tracking of these storms at the stage in their movement when they are most critical, with respect to great population centers of the United States, as well as to the industrial complex of northeastern United States. To illustrate the value of such installations one may consider how an installation at Hatteras, N. C., would be used. It has been observed that virtually all hurricanes that affect New England in any serious degree, pass within 150 miles of Hatteras. A radar site at Hatteras could observe the minute-by-minute position of the eye of the hurricane at ranges of 150 miles or more and determine the direction and rate of motion and the changes therein, and so determine whether the hurricane would pass inland into New England or move harmlessly out to sea beyond Cape Cod. The height of the storm could also be determined as well as something of the wind velocities attending the storm.

149. *Protective measures.*—The problem of providing adequate protection for both property and life against the tidal and interior flooding and the abnormal winds of hurricanes is a problem requiring considerable investigation and study. An examination of records clearly indicates that it is not uncommon for hurricane winds, often accompanied by tidal flooding, to devastate the exposed coasts of southern New England and Long Island. The potential danger to property and life resulting from such storms is directly proportional to the concentration of development in the affected area. The highly concentrated nature of modern urban industrial and commercial development in such coastal centers as Providence and New Bedford, and the similar concentration of modern coastal recreational development along much of the New England and Long Island coasts has vastly increased the potential damage to property and life resulting from such storms in the area.

150. Since the construction of effective shore protective structures is costly, such structures were not, in general, justifiable as long as relatively infrequent storms threatened only small amounts of property and small numbers of lives. In proportion, however, as population concentration and the value of affected property increases, it is clear that the ratio of benefits to costs for protective

measures will increase. Damage resulting from the serious hurricanes of 1938 and 1954 make it clear that at least in some areas development may have become so concentrated as to make benefits exceed even high initial costs. The seriousness of the problem would appear to justify the thorough investigation and study necessary to determine the most feasible means of protection, and the degree of economic justification for such protection in particular areas.

151. Hurricane damages result from abnormal tide and wave action and from floods caused by the accompanying torrential rains, as well as from abnormal winds. Damages involve economic losses to property and loss of life. Many damages, such as those to crops and trees, and the losses resulting from the disruption of normal business activities, obviously cannot be prevented, or even relieved. Others can, in some cases, be protected against by the construction of effective barriers to water, and in other cases can be prevented by foresight in the adoption of measures which prohibit exposure to danger. Protective measures include the construction of seawalls, bulkheads, dams, and dikes, groins, and breakwaters to protect established areas from the onslaught of unusual wave action and flooding; and the construction of adequate drainage systems to care for the excessive runoff created by the torrential rains accompanying hurricanes.

152. The measures which may be classified as preventive include the establishment of fully adequate warning systems, the proper education of the population in areas likely to be affected, provisions for the orderly evacuation of critical areas, the establishment of proper hurricane shelters, and the adoption of zoning restrictions preventing valuable building in areas which cannot be adequately protected, and of building codes which will provide security to valuable property under abnormally high wind conditions. This topic has been covered in large measure in previous paragraphs. The nature and requirements of various types of protective structures are discussed in the following paragraphs. More detailed studies undoubtedly should be made to determine the economic feasibility of particular measures in critical areas.

153. *Protection from abnormal tide and wave action.*—In general, protection from abnormal tide and wave action can be secured by providing in greater strength and to a greater height the same measures designed to protect shorefront property, beaches, shorelines, and shipping and boating facilities against normal wave action. Such measures include the construction of seawalls, bulkheads, dams, dikes, groins, and breakwaters and the placement of beach fill. The type and extent of a structure which would be most effective or economically justifiable for a particular site depends upon the physical characteristics and economic status of the area to be protected, and upon the relationship between the cost of protective construction and the value of property to be protected. A harbor containing extensive shipping installations requires one type of structure whereas a low-lying colony of summer cottages requires another. Inasmuch as the cost of such structures is great, and their effectiveness is dependent upon adequate design, their design, development, and construction should be undertaken only by experienced technical personnel, and only after detailed studies have been made to determine the most feasible and economically justifiable plans. Various possible types of protective works are described in the following paragraphs.

(*a*) *Seawalls.*—A seawall is a structure separating land and water and designed to prevent erosion and other damage due to wave action. It is the normal means of protection against heavy seas at points where it is necessary to maintain structures near the natural shoreline. A secondary function of the seawall, similar to that of a bulkhead, is to retain or prevent sliding of the land. To resist the heavy force of breaking water, it must be well designed and of heavy construction, generally of concrete, and be provided with deep, solid foundations protected by riprap, or stone. The height of the wall should at least be equal to that of the maximum storm wave, for full protection and generally higher to prevent overtopping by breaking waves. The ends of the wall should be tied into high ground with wingwalls to prevent flanking. The toe of the wall should be revetted with riprap to prevent undermining. The surface behind the wall should be filled to the top and paved to prevent erosion or undercutting.

(1) Seawalls are placed parallel or nearly parallel to the shoreline, and, by themselves, are most effective where there is little littoral drift along the shore, or where it is desired to maintain a depth of water along the shoreline as for a wharf or pier line. Since a wall generally produces more erosion on the water side of the beach area, where there is already a high littoral drift, further pro-

tection by groins may be necessary to prevent undercutting of the footings of the seawall.

(2) The shape of a seawall can be a major factor in its use and effectiveness. Walls which are concave on their water side are best adapted to counteract waves breaking on them. The concave surface of such a wall deflects the wave seaward thereby tending to dissipate the energy of successive waves and to lessen the amount of dangerous overtopping. Such walls are particularly desirable if the beach is narrow or nonexistent, and if the water level is over the base of the wall during high or storm tides. Vertical, or nearly vertical walls, although somewhat less effective against wave attack and overtopping, have the advantage of being usually easier and less expensive to construct. In addition, they are best suited for use as landing places besides navigable water, for convenience in loading and unloading vessels. Stepped-face walls provide the easiest access to beach areas, and also act to disrupt the scouring action of wave backwash. The least effective design against wave attack or overtopping is the backward sloping or convex-faced wall. Although possibly more adaptable as emergency protection when the only available materials are sand bags or large stones, walls of this design should be restricted to those areas where overtopping is not a problem, or where structural, emergency, or aesthetic considerations prohibit the use of other wall designs.

(3) The costs of seawall construction are relatively high, especially if they are to be built with strength to withstand intense storm wave action and to a height adequate to prevent overtopping from maximum tides. Consequently, their construction is normally limited to those areas where the value of existing property is already so great as to demand the maintenance and protection of the shoreline in its present position.

(*b*) *Dikes and dams.*—Dikes and dams are sturdy barriers designed to prevent or control the passage of water by closing off a particular area. They may, like seawalls, be built parallel to the area to be protected, or they may be constructed across a waterway. They are variously constructed of earth, concrete, or steel. Earth is gaining in popularity because of its abundance and relatively low cost. Where dikes or dams block a waterway, gates must be provided to control the flow of water. Where waterways are navigable, facilities, usually in the form of locks, must be provided for the passage of ships.

(1) Dikes and dams have been proposed for protecting several localities in New England from the damaging effects of tidal flooding. Generally, these proposals require the provision of pumping stations to accomplish interior drainage during the period when gates may be closed. At some localities, however, where interior drainage is small compared to the size of impoundment, it would be possible to omit pumps and to install weirs with gates, or drainage gates with flap valves.

(2) Dikes and dams are usually substantial structures built to withstand severe stresses. Consequently their construction is costly and can be economically justified only when substantial damages can be prevented.

(*c*) *Bulkheads.*—A bulkhead is similar to a seawall except that its function is primarily to resist earth pressure and only secondarily to withstand wave action. Actually a given protective structure may be called a seawall at one location and a bulkhead at another, depending on its purpose. In general, however, bulkheads are less stable and are best to afford protection to bluffs from erosion or to maintain deep water along a wharf or a pier.

(1) Bulkheads, which are protected by a permanent beach berm from the direct impact of the waves, may be built to a height of approximately 2 feet above the height of the maximum wave uprush, or to a height equal to that of the fill which they are designed to retain. They are most commonly constructed of sheet steel piling, although many are built of concrete or timber. The major factor determining the choice of building material is the susceptibility of the structure to direct wave attack and salt water erosion. The greater the exposure to such attack, the greater the necessary strength. Whatever material is used, however, care must be taken to adequately protect the foundations of bulkheads from scour or settlement by protecting the base of the structure with riprap or large stones.

(2) Bulkheads have the advantage of low initial cost compared to the generally more elaborately constructed seawall. Maintenance costs, however, are relatively high. Consequently, the selection of this type of protective structure must be predicated on an annual benefit-cost ratio. Studies of the economic justification of bulkhead construction must consider the extent of continued use and the possible future development of the area to be protected.

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(*d*) *Groins.*—A groin is a shore protection structure, usually built perpendicular to the shoreline, which functions to trap the littoral drift or to retard erosion of the shore. It is narrow but long enough to extend from a point landward of the shoreline out into the water a sufficient distance to provide stabilization of the shoreline.

(1) There are several types of groins: permeable or impermeable, high or low, and fixed or adjustable. Permeable groins contain openings of sufficient size to permit the passage of appreciable quantities of littoral drift. Impermeable groins are generally solid structures which prevent any littoral drift. Some permeable stone groins may, however, become impermeable from heavy marine growth. A permeable groin appears in many cases to be preferable since an impermeable structure, in building up an accretion of sand on the updrift side, prevents the necessary replenishment of sand on the downdrift side. Many factors must be considered in selecting the number and size of the openings in a permeable groin: the slope of the beach; the height, length and angle of approach of the waves; the magnitude of the littoral drift, and the size of the beach material. The choice between permeable and impermeable groins must be based upon a careful study of all factors in the area concerned.

(2) The height of a groin depends on the volume of sand movement at the location where protection is desired. At the base of a headland or reef, or at the entrance to a bay or inlet where it is not necessary to maintain a sand supply downdrift of a groin, it may be built to a height that would completely block the passage of all material moving in that area. However, where it is desirable or necessary to maintain a sand supply downdrift of the groin, it may be built to such a height as to allow overtopping by storm waves or by waves at high tide. Such low impermeable groins serve the same function as a permeable groin, and are more stable and positive in their action.

(3) The majority of groins are constructed as permanent structures, but the adjustable type is sometimes used where it is desirable to maintain the downdrift beach while inducing beach building updrift of the groin. These groins consist of adjustable batter boards between piles. The batter boards are positioned to permit the accumulation of a desired amount of sand in stages. At the end of each state, sand is allowed to pass over the groin and thereby replenish the downdrift beach.

(4) The shape and dimensions of a groin depend on the wave forces to be withstood, the type, the material with which it is to be built, and the construction methods used. The length is determined by the depths in the offshore area and the extent of the littoral drift it is desired to intercept. The most desirable shape of groin is one of trapezoidal cross section.

(5) Groins may be constructed of concrete, steel, stone, timber, or combinations thereof. Most concrete groins are made up of precast blocks with flexible joints laid in place on the sand, gravel, or a mat of crushed stone, then connected with a poured concrete blanket or cap after they have settled. Although susceptible to corrosion, steel sheet pile groins with interlocking joints have proven satisfactory against wave attack, and provide positive sand-tight connections between adjacent piles. The steel piling is normally used in conjunction with timber members and bracing, all creosoted for maximum protection against marine borers. Stone groins are usually constructed of either rubble or of cut stone blocks.

(6) For an impermeable stone groin, the voids between the rubble stones used in the core of the structure are filled with fine material or cement grout. This core is then capped with stones of sufficient weight to protect the structure from anticipated wave damage. Stone groins, comprised of blocks ranging in weight from 2 to 6 tons apiece, are generally permeable in nature, but may be made impermeable by placing a steel sheet pile diaphragm down the center of the stone blocks. The most common type of timber groin is an impermeable structure composed of sheet piling supported by wooden timber and piles. The wooden members must be given the maximum treatment of creosote.

(7) In selecting the type of groin needed at a particular location, many factors must be considered. These include the topography of the area, the soil composition, the character of the foundation, the range of tide, littoral drift, wave characteristics, tidal currents, and the economics of the individual project. Where an extensive beach area is to be protected, a group of groins is usually necessary and the cost thereof may be excessive.

(*e*) *Breakwaters.*—A breakwater is a barrier of solid construction built out into the open sea to break the force of the waves and to provide comparatively smooth water inside for the anchorage of vessels or their landings at wharves

or piers. The breakwater differs from the jetty in that the jetty is a barrier (generally 1 of 2 parallel barriers) usually built at the mouth of a river in such a form as to induce the river currents to scour the bottom of the harbor entrance and remove from the channel, sand, silt, and earth, or to prevent the shoaling of the protected channel by littoral drift from beaches adjacent to the river mouth. Properly constructed, breakwaters are a highly efficient means of protecting against the destructive force of wave action. The characteristics and uses of breakwaters are described in the following paragraphs:

(1) Breakwaters may be classified as connected or detached, as exposed or submerged. A connected breakwater is one which is built out into the sea from an attached point on land; a detached breakwater is one which is built entirely within the water. Exposed breakwaters are those that are uncovered only at low stages of tide as well as those never completely submerged. Submerged breakwaters are those which have their tops below low water level, their function being to retain beach fill or to reduce the force of waves by causing them to break before reaching the shore. The general dimensions of the breakwater are governed by the prevailing height, length, and force of the waves which it is designed to provide protection against. The extent to which the submerged breakwater will reduce wave action is dependent upon the ratio of the depth of water over the breakwater to the depth of water at the site.

(2) The height of the exposed breakwater necesary to prevent significant overtopping should be one and one-half times the height of the design wave over the design water level. In most cases the slope of the seaward side should be flatter than that of the landward side, the slope being dependent on the size of the design wave and the weight of the stones or blocks of which the breakwater is built. Needless to say, the superstructure of the exposed breakwater must be designed to withstand the tremendous direct force of wave attack on the seaward side and the force of the receding wave action on the landward side.

(3) Since a breakwater is usually an expensive structure, the type to be used at a paraitcular site is largely dependent upon the amount of protection which is economically justifiable at that site. Important factors to be considered in determining design are the magnitude of wave action, the height and length of waves, the tidal range, the depth of water at the proposed site, the topography of the bottom, and foundation conditions. Of the submerged and exposed types, the latter is of course by far the more susceptible to damage from wave attack, although the destructive forces of the sea extend to sufficient depths to damage submerged ones. In all cases the core material must be protected by heavy blocks or rubble.

(4) Breakwaters may be constructed of stone, concrete, steel, timber, or various combinations of these, and designs vary widely according to a variety of factors at the particular site to be protected. The selection of material depends upon cost, adaptability, and availability at the proposed site. The most common general designs are described below:

(*a*) A rubble-stone mound structure may be used in any depth of water on any kind of foundation. This type has generally been used in New England. Such structures are easily repaired if damaged, or if settlement occurs, and the reflected wave action is less severe than that from a solid wall. The advantages of economical maintenance are partially offset, however, by the high initial cost of this type of structure. This high cost is largely attributable to the large quantity of material needed, and is proportionately increased if necessary material is not readily available.

(*b*) A stone-and-concrete breakwater may be either a rubble mound in which the voids are grouted with concrete, or a massive concrete superstructure on a rubble-mound substructure. Both types tend to be relatively economical, especially in deep water, since relatively small quantities of material are needed. The rubble-mound foundations must be protected from scour, and given time to settle before the concrete superstructure is added.

(*c*) A concrete caisson breakwater is suitable for depths from 10 to 35 feet. The caissons, precast as hollow, reinforced concrete shells, are floated into position, settled on a prepared foundation, filled with stone or sand, then capped with concrete slabs or cap stones. Heavy riprap is usually placed along the caissons to protect against scour or horizontal displacement.

(*d*) Steel-sheet piling breakwaters may be used where storm waves are not severe. The sheet piling may be in the form of a wall, or as a double wall with the space filled with stone or sand. This type of structure is generally economical and easy to build, but it is susceptible to the corrosive action of the salt water

and the abrasive action of the sand. Constant maintenance is necessary. Another variation of sheet-piling breakwaters is the cellular-steel type, which requires little maintenance and is sutable in depths up to 40 feet and on all kinds of foundations.

(*c*) Timber crib structures, used in the construction of breakwaters, are similar to the caisson type in that they are floated into place in sections, settled into position on a prepared foundation by filling them with stone. They are then capped with timber, concrete, or cap stones. The superstructure and decking of cribs set on a rubble-mound foundation are often of timber to allow for settlement of the crib. This type of structure is suitable for depths up to 50 feet or more, except where marine borers are present. Foundation stabilization is similar to that for the caisson type.

154. *Zoning.*—The recurrence of hurricanes has suggested the desirability of zoning in coastal areas susceptible to tidal flooding. Portions of large cities as well as residential areas in southern New England and Long Island suffered heavily from tidal flooding accompanying the hurricane of 1938 and again in 1954. Whole summer colonies were wiped out in 1938 and again in 1954. The recurrence of the devastation at an interval of only 16 years has convinced many State, city and town officials of the desirability of revised zoning. Some towns have discovered that the tax income from summer cottages situated along the ocean front is insufficient to pay for necessary services, particularly when roads, and water lines may be periodically destroyed. A possible solution of the problem may be found in the purchase of coastal beaches by towns or States. These areas could be reserved in an unoccupied State for public enjoyment. Adequate access roads would be required to enable orderly evacuation of the beaches at the approach of a hurricane. Proper restriction measures along the exposed, low lying coastal areas appear to offer a feasible method of preventing considerable damage and suffering from tidal flooding. Zoning measures which might be adopted would have to be designed for the particular area to be protected.

155. *Protection from floods caused by hurricane rains.*—The copious rainfall associated with cyclonic storms presents no new problems in protecting interior areas from floods. The flood-control structures in the flood-control plans for the major river basins would provide a high degree of protection from floods resulting from hurricane rains.

156. *Drainage improvements.*—Drainage improvements consist of modernizing and increasing the capacity of storm drainage systems in builtup areas and increasing channel and culvert capacity on interior drainage areas to permit more rapid dissipation of excessive runoff. The need for providing additional facilities in builtup areas was not forcibly illustrated during the 1954 hurricanes except at certain localities such as New London, Conn., where the storm-drainage system was previously known to be inadequate. The following subparagraphs discuss drainage-problem areas and methods of dissipating excessive runoff.

(*a*) *Storm sewers.*—In general, the design of storm sewers depends upon the degree of economically justifiable protection required to provide against the damage and inconvenience resulting from overcharged sewers. It is not always economical to construct storm sewers sufficiently large to discharge the runoff from extreme storms that are likely to occur at infrequent intervals. Therefore, it appears that storm-sewer capacity in New England communities may not be expected to be sufficient to care for high runoff such as occurred in some localities during Hurricane Edna. However, where unusual problems exist, as at New London, sufficient study should be undertaken to determine what measures will be economically feasible.

(*b*) *Interior areas.*—Drainage-problem areas along interior streams have existed for many years. Consequently, many of these areas have not been developed for residential, commercial, and industrial use. These areas invariably suffer during periods of heavy precipitation, because downstream channel capacities are insufficient to discharge the heavy runoff from the flat terrain of low elevation. In addition, due to a flat slope in the drainage rivers, the channels are often restricted by sandbars. Following flood periods the water level of such rivers recedes to normal very slowly, causing serious inconveniences to all the owners along the particular river.

(1) The Concord River Basin provides an example of poor interior drainage. Flooding in this area following Hurricane Edna caused considerable damage by flooding the cellars of commercial establishments and residences. Remedial

measures for this and other areas which are subject to similar flooding during periods of heavy localized precipitation can be formulated only through detailed engineering investigations.

157. *Protection from abnormal winds.*—In general, there is no complete protection or relief from damages caused by abnormally high winds. In addition, certain measures which might be taken to minimize the possibility to some kinds of damage are of a nature likely to be unpopular. The recent hurricanes experienced in the New England-New York region have, in each case, uprooted and broken many trees, seriously damaged vegetable and flower gardens, stripped fruit from trees and frequently destroyed the trees themselves, and flattened fields of corn, rendering them worthless except for silage. In addition, hurricane winds have done large amounts of minor structural damage to homes and other buildings, stripping roofs, doors, porches, shutters, television antennas, chimneys, and other exposed building fixtures. In commercial establishments, many plate-glass windows and advertising signs have been destroyed. For the most part, prevention of such wind damages as these is entirely impractical. Heavy damages to power lines, houses, and automobiles, as well as the danger to human lives resulting from falling trees are probably equally impracticable to prevent. Although much of this type of damage, particularly that occurring to powerlines, could be prevented by the removal of shade trees, public sentiment would probably resist such removal on aesthetic grounds. Some protection might be obtained by careful selection of shade tree species. Cases of major structural damage due to wind were uncommon in the 1954 hurricanes, although one large television-transmission tower was blown over and several church steeples demolished. Such damages as these undoubtedly could have been prevented by more adequate building codes and suitable maintenance practices. The two measures most often considered for the reduction or prevention of hurricane wind damages are the revision of building codes and the use of underground utility lines. These are discussed briefly in the following paragraphs.

(*a*) *Revision of building codes.*—The extent of structural damage caused by wind alone in the recent hurricanes appears to indicate the desirability of more stringent building regulations for major installations. Major structural damage could be eliminated or minimized if all industrial and commercial installations were designed to withstand winds exceeding those already experienced in the area. Towers, signs, and other similar structures should be covered in appropriate revisions of the building code. Such provisions would not substantially increase the cost of the affected structures.

(1) The adoption of revised building codes for residential structures of seasonal nature, such as summer cottages, presents economic problems. Major wind damage to these structures was not generally extensive, although in some localities exposed buildings were apparently demolished by the force of the wind. Evidence indicates that in certain areas wind alone was sufficient to destroy cottages before tidal flooding occurred, which, in any event, would have destroyed them. There is insufficient evidence, however, to indicate that major revisions in building codes are necessary for summer residences situated above the reach of expected tidal flooding. Since individual wind damage was relatively minor and only minor human suffering can be attributed to wind alone, there appear to be serious objections to the establishment of stringent building codes for this type of structure. This is particularly true since any major structural changes would require costly provisions in these buildings which might prohibit the enjoyment of ownership by a large segment of the population.

(*b*) *Underground utilities.*—The 1954 hurricanes caused severe interruptions of electric and telephone service. As a result, there has been popular agitation for placing all utilities underground as a means of preventing future periods of interrupted service. The following paragraphs discuss the effects of hurricanes on electrical and communication lines, and the problems incident to underground placement of wires.

(1) *Effects of hurricanes on utilities.*—The electrical utility companies and the communications companies suffered severe losses during the 1954 storms Service throughout the region was curtailed for varying periods. Major damage was caused to electrical distribution lines and telephone lines. Major transmission lines along cleared right-of-way were relatively unscathed. Distribution and telephone lines usually are placed adjacent to the public highways and streets, where they compete for space with shade trees. During the 1954 hurricanes, entire trees or limbs were blown across the telephone and power lines. Over 861,000 of 1,500,000 customers in New England served by 4 utilities were reported to be without power for periods up to 1 week following Hurricane

Carol and for a shorter period following Edna. Many of the residential customers depended on electricity for refrigeration, cooking, and water supply in addition to lighting. About 250,000 telephones were reported to be out of service in Massachusetts, Rhode Island, New Hampshire, and Maine and a large number in Connecticut. Along the coast, tidal flooding of giant thermal electric plants rendered the stations inoperable.

(2) The effect of the storm on utility generation of the New England Electric System is graphically illustrated on the load chart shown on plate 81. The New England Electric System publication Contact reported as follows: "High water and wind-blown material hit the steam stations knocking out 275,000 kilowatts. Then another 100,000 kilowatts followed by 160,000 more. * * *The resources of the hydro plants were put to maximum use." Plate 81 illustrates this drop in load and also shows the rapidity with which this utility mobilized its forces, with outside help, repaired lines and equipment, and restored normal operations. Plate 82 shows the effect of the hurricanes on the communications system of the New England Telephone & Telegraph Co. and indicates the outstanding work accomplished in restoring telephone service, with the help of crews from other areas.

(3) *Benefits from underground placement of utility lines.*—The utilities and the communication companies have accomplished some underground placement of lines, principally in the metropolitan areas. The business section of Providence, and several small communities are served by underground lines. In Boston, the Boston Edison Co. in reecnt years has had a program for placing 4 miles of wire underground annually. The major benefit of underground utilities, aside from aesthetic benefits, would include more dependable service with fewer and shorter interruptions than occur with above ground lines. However, when underground lines have been inundated, there is a considerable delay in drying them out before service can be restored.

(4) *Cost of underground placement.*—A major deterrent to underground placement of utility lines appears to be the installation and maintenance costs not only to utility companies, but in many cases to householders and business customers. A study made recently in Connecticut indicated that it might cost 25 times as much for underground placement of electrical distribution lines as for conventional above-ground construction. Poles required for street lighting purposes would add to this cost. Inasmuch as the greatest damage to utility lines resulted from blowdown of trees, service conditions could be improved by providing unimpeded rights-of-way for these services. This might be publicly unacceptable as it would entail the removal of many fine trees. Additional study of the matter of underground placement of utilities is desirable. In this connection, the Massachusetts Department of Public Utilities has announced that it is making a study of the cost of placing power and telephone lines underground. The 1955 session of the Massachusetts Legislature will consider bills which would require utilities to place overhead lines underground.

(5) *Conclusion.*—Underground placement of power and telephone lines is feasible in populated areas as indicated by existing installations. Extension of these lines might prevent some of the major service interruptions which occur during storms of great intensity. Other factors, such as protection of the coastal thermal generating plants should be considered. Considerable study is required to determine the economic feasibility and desirability of underground lines. Such a study should be made and the results publicized.

158. *Hurricane shelters.*—It has been noted herein that tidal flooding caused the greatest damage to life and property. Wind alone, although destructive, did not generally endanger well-constructed buildings. Consequently, the matter of providing shelter for evacuees from the threatened area is primarily important in the coastal areas. Public shelters are not needed at inland points except where interior river flood victims require assistance. During Hurricane Carol, and preceding Hurricane Edna, hundreds of people were evacuated from the coastal areas of Connecticut, Rhode Island, and Massachusetts and found shelter with friends, in hotels, or in public buildings. Emergency relief agencies provided food and beds for many people. Existing disaster and relief agencies were, in most cases, able to provide for the needs of the hurricane victims. Public buildings were generally adequate to give the short-term quarters required.

159. Experience gained during Carol indicated that permanent planning was needed to prevent confusion. People living in areas subject to tidal flooding should have advance knowledge of the location of facilities available to them in periods of danger. Beds, bedding, food, nonelectric cooking facilities, sanitary provisions, and medical attention should be readily available on short notice.

It is possible that in the future the coastal areas should be evacuated promptly upon official warning of the approach of a storm. Some means should be available for the temporary shelter of an increasing number of people. No special structures are required. Emergency shelters, such as are common in the West Indies, are not needed in New England, as public and private permanent-type structures are generally sufficiently strong to withstand the force of the winds.

160. *Protective measures for specific localities.*—Various methods which might be employed for protection against tidal flooding have been described in the preceding paragraphs. The application of some of these measures is discussed in the following paragraphs for certain localities which received substantial damage during Hurricane Carol. Many other localities also received damage and might well warrant protection. Studies of these localities as well as detailed consideration of the areas included in the discussion below might form the subject of special studies of greater scope than the present report.

(*a*) *Fairfield, Connecticut, area flooded.*—The town of Fairfield (population 30,489 in 1950) is located on the north shore of Long Island Sound, immediately west of and adjacent to the city of Bridgeport, Fairfield County, Conn. The area subject to tidal flooding covers about 1½ square miles, extending laterally about 2½ miles from South Pine Creek Road on the west to Ash Creek, the Bridgeport-Fairfield town line on the east, and extending inland from the shore a maximum distance of 1.3 miles and an average distance of 0.6 mile. A barrier beach, 7 to 10 feet above mean high tide, extends along the shore from the mouth of Pine Creek to the mouth of Ash Creek. Over 250 summer and year-round homes have been constructed along Fairfield Beach Road on top of this barrier beach. Behind the beach, on land only slightly higher than spring tides, are over 500 permanent homes, a veterans' housing development, an elementary school, valued at $750,000, the town sewage-treatment plant and the town garage. The assessed valuation of homes in the flooded area is reported to be nearly $10 million. The extent of tidal flooding is shown on plate 83.

(1) *Cause of flooding*: Tidal flooding has occurred in two ways. At the time of extreme high tides and a southeasterly wind, the low lands behind Fairfield Beach Road are inundated by tidewaters backing up Pine and Ash Creeks at either end. Such flooding has occurred 3 times in the past 4 years—on November 25, 1950, November 7, 1953, and August 31, 1954.

(2) *Extent of damage*: Hurricane Carol, on August 31, 1954, not only caused tidal flooding through Pine and Ash Creek but in addition breached two places in the barrier beach and overtopped the beach at the end of Beach Road, flooding the built-up area to a maximum depth of 5 feet. Many of the summer cottages and homes along Fairfield Beach Road are protected by seawalls which average about 6 feet in height above mean high tide. According to residents of the area, the waves during Hurricane Carol splashed over these walls in places but no substantial damage resulted from this cause. About 2,000 feet southwest of the junction of Reed Road and Fairfield Beach Road, there are four cottages in front of which there is no seawall. Waves scoured beneath these cottages, washing substantial amounts of sand onto Fairfield Beach Road but causing only minor structural damage. Wave action also scoured a hole under the Penfield bathing pavilion, depositing a heavy layer of sand near Penfield Road. At the end of Beach Road, the waves overtopped the barrier beach, depositing sand on Beach Road to beyond Fairfield Beach Road.

(3) *Possible remedial measures:* Protection to the area from flooding through the Pine and Ash Creek ends can be quite readily accomplished by means of low dikes not exceeding 10 feet in height, extending from high ground at either end and tying into the barrier beach at suitable locations. Pipes with tide gates would be necessary to provide drainage from interior runoff and the two creeks.

(4) There are three possible methods of preventing damage from frontal tidal action: (*a*) Construction of a concrete or masonry seawall for the entire length of the barrier beach tying into the two dikes previously described; (*b*) the artificial placement of sand to increase the barrier beach to such height that it would not be overtopped; and (*c*) the raising of Fairfield Beach Road to an elevation above any anticipated tidal heights, extending it as necessary to tie into the above-described dikes. The first method would be extremely costly and might meet with considerable opposition by owners of the summer cottages along Fairfield Beach Road since it would interfere with their view of and access to the beach. The second method could be accomplished either by construction of a flat beach slope which would require periodic maintenance to replace losses of sand caused by normal erosion or by construction of a riprap dike which would destroy the usefulness of the area as a beach. Raising

Fairfield Beach Road would appear to be a reasonable solution to the problem. While this method would not afford protection to the cottages along the beach, it would provide protection to the permanent homes and public buildings in the low area behind the barrier beach.

(5) Costs and benefits: No estimate of the cost for protection of the area has been made. It is estimated that damages due to tidal flooding at the time of Hurricane Carol amounted to $489,000. The tidal flooding in November 1953 covered approximately the same area as that of Hurricane Carol and damages were of comparable magnitude.

(*b*) *New London, Conn., area flooded.*—New London is located on the west bank of the Thames River tidal estuary, approximately 2.5 miles above the point where the river flows into Long Island Sound. The city had a population of 30,551 in 1950, and is commercialized along the entire length of New London Harbor, which extends 3 miles above the mouth of the river. Several military installations and the Coast Guard Academy are also located in the area. The area flooded consisted of all the shorefront land and property adjacent to the river within the limits of the township of New London. The extent of tidal flooding is shown on plate 84.

(1) Cause of flooding: Tidal flooding is caused principally by a combination of hurricane winds occurring at the same time as the normal high tide. The mean range of tide is 2.6 feet, but during Hurricane Carol the tide reached an elevation of 10.5 feet above mean low water. The city of New London, lying along the west side of the open harbor, is particularly susceptible to damage from storm winds approaching from the south and southeast. Shore protective works are not extensive, consisting principally of low walls and revetments to protect private property along the southern beach and residential area, and a few bulkheads and walls in the upper commercial section of the harbor.

(2) Extent of damage: It is estimated that the damages incurred by Hurricane Carol, which arrived at the time of floodtide, were 70 percent due to flooding, and 30 percent due to wind. Damages incurred by Hurricane Edna which passed more to the east of New London and occurred during ebb tide, but brought considerable precipitation with it, were due 60 percent to rain and 40 percent to wind.

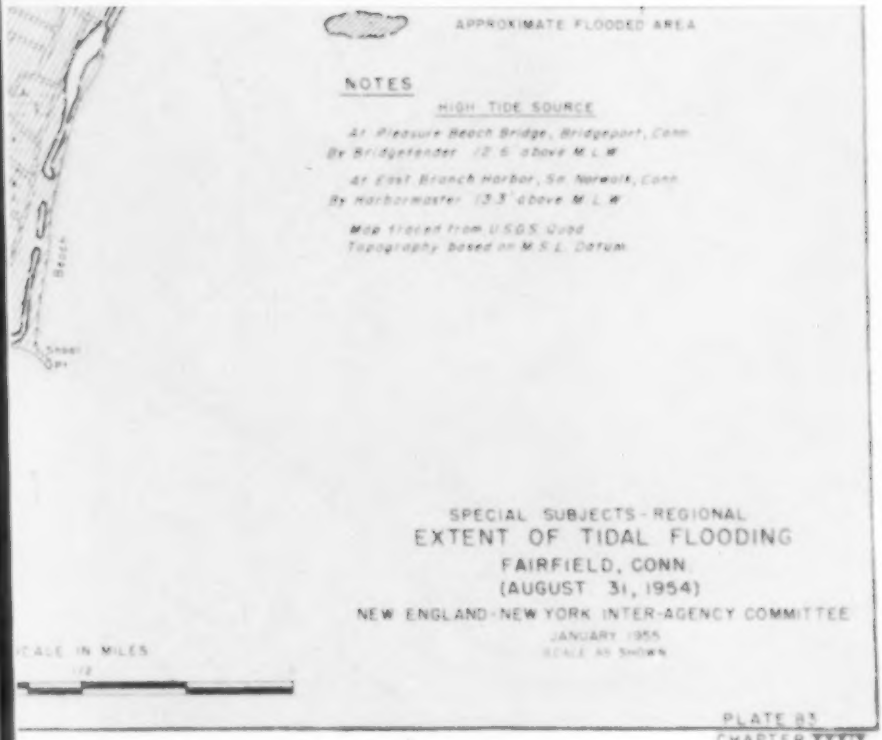
(3) There was no loss of life from either storm, and although some injuries were sustained, none were serious. One thousand persons were evacuated during the first hurricane. As a result of earlier warning about 1,500 persons were evacuated before the arrival of Hurricane Edna.

(4) Along the coast, south of the city, the major damage from Hurricane Carol was to beaches and private property. The New London Lighthouse was not affected although the tide rose as far as its base. Many sections of Pequot Avenue, which closely follows the shoreline, as well as the docks and warehouses below Greens Harbor, were under water. Numerous houses in this area received some water damage, but the majority of them were sufficiently well constructed to sustain only slight damage.

(5) The heaviest loss occurred in the center of the city where about 450 automobiles, numerous stores, between 300 and 400 homes, scores of buildings, and the majority of the wharves and warehouses were inundated. A long stretch of the Central Vermont Railroad, and several sections of the New York, New Haven & Hartford Railroad's shoreline track were under water during the hurricane. At one point on the shoreline, 15 Coast Guard buoys were on the track. The loss of boats, both commercial and private, was high, and the damage to wharves and docking facilities very heavy. At one dock alone the estimated loss to boats and docks was nearly $70,000.

(6) The damage incurred in Hurricane Edna was considerably less than in Carol principally because the center of the storm passed some distance from the city when the tide was near its ebb. In addition, the city was more adequately advised of the approach of the storm so that precautionary measures were taken to safeguard property, foodstuffs, and merchandise. Considerable damage was caused, however, by heavy precipitation over a short period which far exceeded that during Hurricane Carol. Approximately 50 percent of the houses had water in their cellars. Nearly one-half of the total damage was from food spoilage. Flooding of numerous streets resulted in many cases from overflowing storm sewers. Similar overflowing during Hurricane Carol resulted when the high tide forced water to back up in the drains.

(7) The total estimated damage caused by both hurricanes at New London was $2,908,000, 70 percent of which ($2,066,000) was inflicted by Hurricane Carol and 30 percent by Edna. Tidal flooding alone caused damage estimated to total



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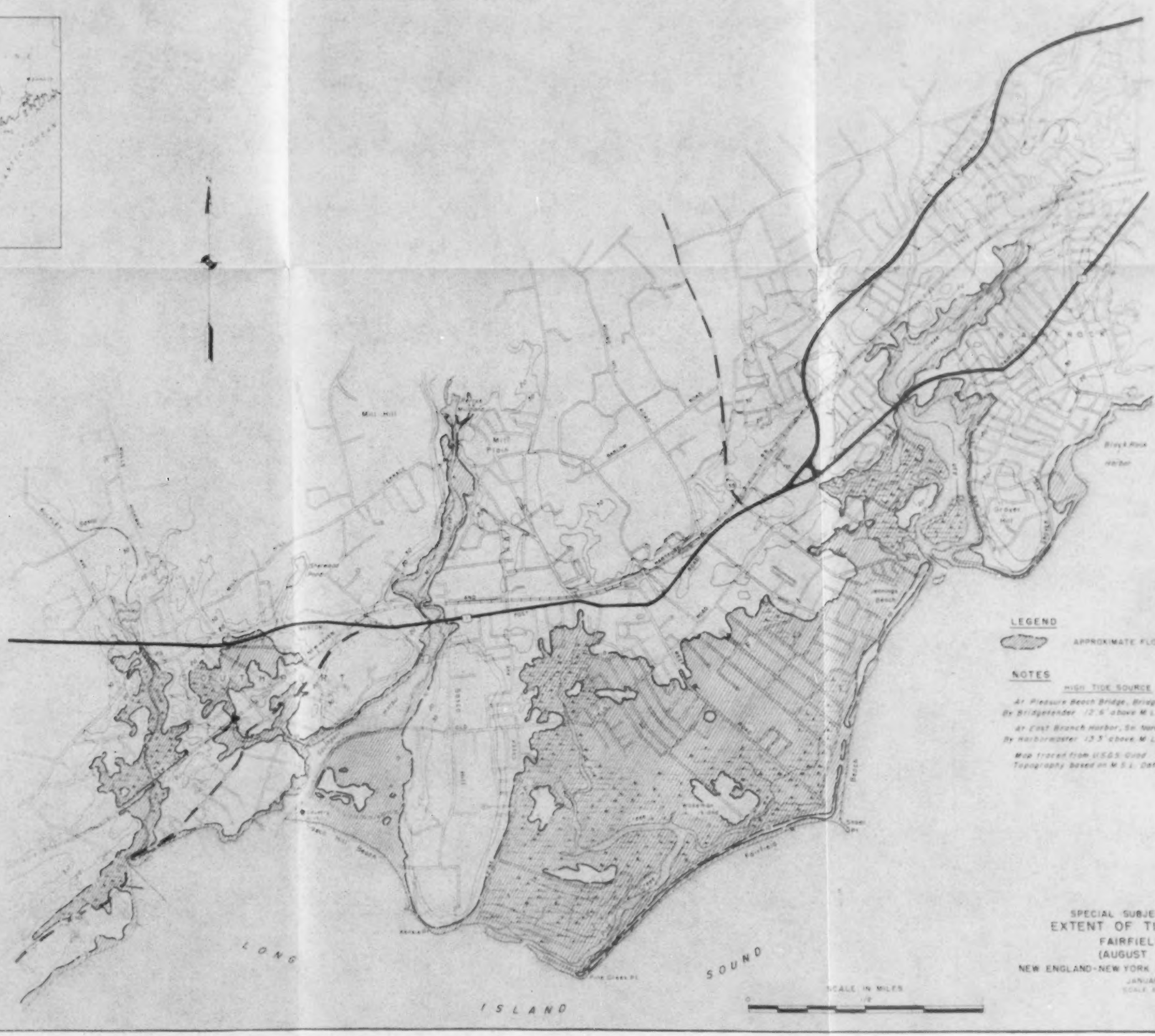

LEGEND

APPROXIMATE FLOODED AREA

NOTES

HIGH TIDE SOURCE

At Pleasure Beach Bridge, Bridgeport, Conn.
By Bridgetender (2.6' above M.L.W.

At East Branch Harbor, So. Norwalk, Conn.
By Harbormaster (3.3' above M.L.W.

Map traced from U.S.G.S. Quad
Topography based on M.S.L. Datum

SPECIAL SUBJECTS - REGIONAL

EXTENT OF TIDAL FLOODING

FAIRFIELD, CONN.

(AUGUST 31, 1954)

NEW ENGLAND-NEW YORK INTER-AGENCY COMMITTEE

JANUARY 1955

SCALE AS SHOWN

PLATE 83
CHAPTER XXXIX

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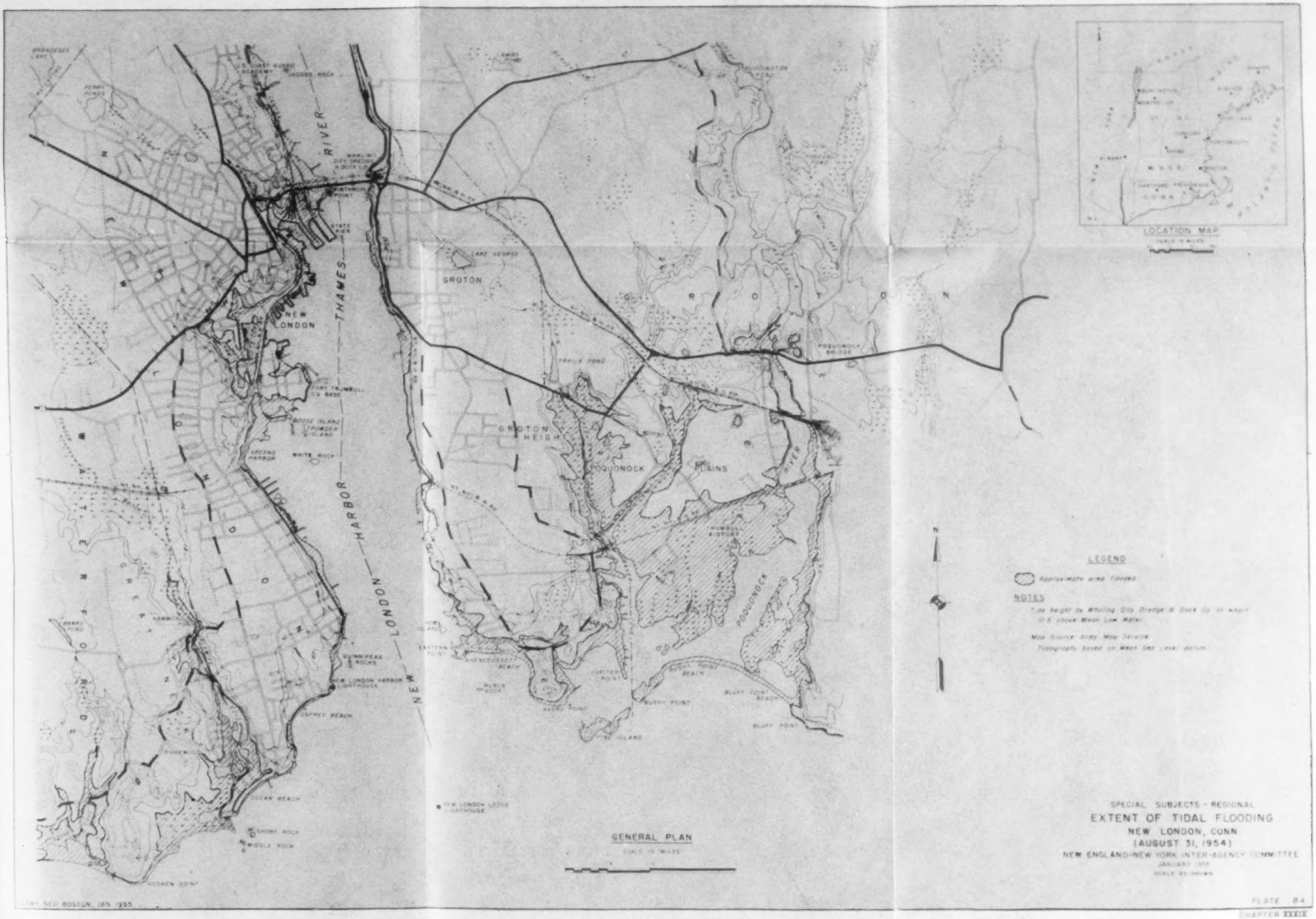
RIVER
THAMES
HARBOR
LONDON
NEW
NEW LONDON
GROTON
GROTON HEIGHTS
POQUONOCK PLAINS
POQUONOCK RIVER
GENERAL PLAN
SCALE IN MILES
LOCATION MAP
N
LEGEND
Approximate area flooded
NOTES
Tide height at Whaling City Dredge & Dock Co. at wharf 0.5' above Mean Low Water.
Map Source: Army Map Service.
Topographic based on Mean Sea Level datum.
SPECIAL SUBJECTS - REGIONAL
EXTENT OF TIDAL FLOODING
NEW LONDON, CONN
(AUGUST 31, 1954)
NEW ENGLAND-NEW YORK INTER-AGENCY COMMITTEE
JANUARY 1955
SCALE AS SHOWN
PLATE 84
CHAPTER XXXIX

$1,383,000. These figures are exclusive of damage to State facilities, railroads, communications, and power. Damage estimates for these items afforded no locality breakdown.

(8) Possible remedial measures: New London officials and residents greatly desire protection from tidal flooding. The community, comprising an area 6 miles long and 1 mile wide, is topographically restricted from further growth. As a center for a resort area, with no large industries, it depends to a considerable extent on the tourist and vacation trade for its income. It is felt that a frequent recurrence of tidal flooding and damage will discourage the tourist trade, thereby dirtcely and indirectly harming the small businesses. At the present time, it appears that seawalls would be the only measures which would offer protection against extreme tides. Seawalls would have to be built to such height that in many cases construction costs might exceed the value of the protected property. A more extensive study of the area is necessary to determine the economic feasibility of a protective program. The principal cause of flooding from excessive surface runoff is the inadequacy of the city storm-sewer system, which often overflows with rainfalls of only moderate intensity. City officials are aware of the situation and are working on plans to redesign the system.

CONCLUSIONS

163. Of the three hurricanes which entered the New England-New York region in 1954, Hurricane Carol was by far the most destructive in the region and caused the largest number of fatalities. Rhode Island and Massachusetts suffered by far the heaviest losses. Carol was comparable in intensity and destructiveness to the hurricane of September 1938, but, due to better preparedness, the number of lives lost was small as compared to over 500 lives lost in 1938.

164. The losses in the region from 1954 hurricanes, as gives herein, total $305,818,900 with incomplete estimates for damages in interior areas. About 75 percent of this figure is attributable to Hurricane Carol. The major portion of the total of losses was sustained in coastal areas of New England and Long Island from the combination of wind, rain, and tidal flooding. Rhode Island and Massachusetts, which have southern coasts susceptible to tidal flooding, suffered about 70 percent of the 1954 hurricane damage recorded for the region. Table 100 summarizes 1954 hurricane experience.

TABLE 100.—*Summary of 1954 hurricane experience, New England-New York region*

	PATH AND AREA AFFECTED
Hurricane Carol (Aug 31, 1954)----	Center crossed eastern Long Island, moved northward into southern New England, passing just west of Worcester, Mass., and continued on through New Hampshire. Area affected, principally eastern Long Island and Connecticut, Rhode Island, eastern Massachusetts, and New Hampshire and western Maine.
Hurricane Edna (Sept. 11, 1954)----	Center crossed Martha's Vineyard and Cape Cod, then northeasterly offshore passing close to Eastport, Maine. Areas affected, principally Cape Cod and eastern Maine.
Hurricane Hazel (Oct. 15, 1954)----	Center entered southwestern part of region passing between Buffalo and Syracuse and on over Lake Ontario. Area affected, principally New York State, south of Lake Ontario.

TABLE 100.—*Summary of 1954 hurricane experience, New England-New York region*

DAMAGE BY STATE

Hurricane Carol:	
Connecticut	$28,168,750
Rhode Island	97,965,900
Massachusetts	92,992,900
New Hampshire	4,128,750
Maine	5,675,000
New York	6,312,500
Total	235,243,800
Hurricane Edna:	
Connecticut	4,766,000
Rhode Island	5,672,400
Massachusetts	10,887,100
New Hampshire	1,369,250
Maine	8,756,000
New York	1,296,000
Total	32,746,750
Hurricane Hazel:	
New York	5,704,200
Connecticut	147,150
New England	100,000
Total	5,951,350
Combination of storms or States	31,877,000
Total	305,818,900

1954 HURRICANE DAMAGES BY TYPES [1]

Loss of life	Between 77 and 82
Public property	$53,822,200
Shipping	12,881,000
Utilities	39,193,900
Transportation	2,800,000
Commercial	55,167,500
Industrial	38,074,500
Agricultural	29,285,100
Foods and drugs	7,278,800
Fisheries	3,786,900
Private property	59,670,000
Other [2]	3,859,000
Total	305,818,900

[1] Estimates incomplete for damage in interior areas.
[2] Inseparable combinations of 2 or more types of damage.

165. Hurricane experience in the New England-New York region has not been sufficient to suggest any probable frequency of occurrence. The record of hurricanes which have involved the region points to a seasonal concentration of occurrence in the months of August, September, and October, but does not show any recurring pattern. It can be noted that hurricanes have occurred in successive months and in successive years and that periods of concentration have occurred. However, these interesting parallels do not exhibit an overall pattern of occurrence. To evaluate the chances of hurricane occurrences or probable frequency at a given site for the New England-New York region would require continuing research. Until a determination of probable hurricane frequency is made, a meaningful estimate of average annual damage at a particular location cannot be made.

166. The greatest damages from hurricanes in the whole region occur as a result of the tidal flooding which accompanies hurricanes in coastal areas. Protective measures against tidal flooding might be justified in coastal areas with high property value. Other preventive, protective, and rehabilitation measures include improved hurricane-warning systems and dissemination of

warnings to the public, evacuation and shelter plans coordinated by responsible State and local groups, coordinated plans for the employment of auxiliary communication and power facilities, zoning and building code revisions and provisions for easing the financial burdens occasions by hurricane losses.

167. In general, the floods which often result from the heavy rainfall accompanying hurricanes would be protected against to a high degree by the flood-control measures already authorized in the major river basins in New England. On the other hand, there are essentially few practical measures other than the stiffening of building codes which can be employed to prevent widespread damage from abnormally high winds.

PLAN

168. The following plan of measures to cope with hurricanes is suggested:

(*a*) Wider and more expeditious distribution of hurricane warnings and advisories.

(*b*) Research to determine the risk of extreme hurricane wind or tidal effects at definite locations, whether or not they have in fact been subjected to the experience.

(*c*) Information programs to familiarize the public with the nature of hurricanes, existing warning services, and possible protection measures.

(*d*) Radar installations for precise tracking of hurricanes on a radio frequency of about 2800 megacycles with a peak power output of about a million watts, in a system with units at Eastport, Maine; Nantucket, Mass.; Atlantic City, N. J.; Hatteras, N. C.; Charleston, S. C.; and Daytona Beach and Miami, Fla.

(*e*) Studies to determine the economic feasibility and desirability of underground placement of power and telephone lines.

(*f*) Studies to determine the desirability, and economic and engineering feasibility of providing protection against tidal flooding in areas which have experienced heavy losses.

(*g*) Studies of individual areas subject to the devastation of tidal flooding to determine what zoning measures might be enacted.

Senator BUSH. Then I should like to insert into the record a letter from John R. Hobson, of the Plax Corp., Stonington, Conn., describing the effects of Hurricane Carol on his plant.

That is one of the largest disasters in our whole area as a result of that hurricane.

(The above-mentioned document is as follows:)

PLAX CORP.,
Hartford, Conn., March 23, 1955.

Re hurricane damage at Stonington, Conn.

Hon. PRESCOTT BUSH,
United States Senate,
Washington, D. C.

DEAR SENATOR BUSH: We wish to bring to your attention the vital necessity for action in protecting the harbor and shoreline in the village of Stonington, Conn., before the beginning of the next hurricane season.

This matter has become especially urgent because this company has under consideration an undertaking for construction and installation of equipment on and about its property to protect its plant from flooding.

Until this company is assured that steps will be taken to protect the harbor and shoreline by means of improvement in the disposition and structure of breakwaters, the substantial expense involved in the protection of the plant itself cannot be undertaken.

We enclose herewith a page of photographs and reprint from the Hartford Times of September 2, 1954, graphically illustrating and describing the tremendous loss which this company suffered from Hurricane Carol. Your attention is directed particularly to the picture entitled "Shattered Seawall and Glass Brick Windows."

The annual report of this company contains the following statement regarding the hurricane damage:

"On August 31, after only a short period of full-scale operations on its expanded basis, the Stonington plant was badly disrupted by extensive hurricane damages. Inventory losses and plant rehabilitation costs caused by the hurricane and

totaling $616,795 have been charged to surplus account. Although the company's insurance coverage is as extensive as can be had, losses entirely caused by flood and tide waters are excluded. An insurance claim is being prepared but no indication can be given at this time as to possible insurance recoveries."

As will be apparent, this company cannot be expected to continue operations in its plant at Stonington with the prospect of a repetition of such heavy losses through hurricane damage, and may be forced to abandon this plant unless adequate protective measures are taken. This would result in a substantial loss to the community, as well as to the company.

Information received to date with respect to the consideration of the Stonington disaster is discouraging. We have learned through the State of Connecticut Development Commission that as of October 29, 1954, no action was planned by the Corps of Engineers.

On February 2, 1955, Congressman Seely-Brown advised the development commission concerning the Stonington Harbor project as follows:

"It is my understanding that no funds have ever been appropriated to commerce the revised project, as authorized, and the recent budget request submitted to the Congress did not include a recommendation for such funds."

An article published in the Hartford Times of Tuesday, March 22, 1955, and referring to a compilation sent by you to Governor Ribicoff, contains no mention of any appropriation or other action concerning Stonington Harbor.

We would greatly apreciate your assurance that the Stonington Harbor project has not been overlooked and will receive early consideration, and we will be glad to be of any assistance that we can in this matter.

Respectfully yours,

PLAX CORP.,
By JOHN R. HOBSON,
Secretary and Director.

[The Hartford Times, Wednesday, Sept. 1, 1954]

"THUD" THEN FLOOD IN STONINGTON

(By Malcolm Stannard)

Entering the sea-swept jut of land that holds the borough of Stonington, you get the momentary feeling at the height of the hurricane that Paul Bunyan might have been married there yesterday.

Everything is knocked cockeyed, just as it might be during gargantuan merriment, and the streets are littered with gay-colored confetti. There is confetti the length of Water Street; there is confetti on front porches of beaten homes. Along the way the trees have been pushed down by mighty muscles and in the little park, young maples have died in windrows.

* * * * * * *

But it was no merriment that caused it all.

The quaint and beautiful village that suffered great harm in 1938 has been smothered again by a hurricane. For hours it was cut off while seas pounded exposed beaches and streets and heavy drifting timbers and 100-pound rocks were hurled up by the tide.

The tide rode in on the wind.

It battered hard against the factory of the Plax Corp.—a division of Hartford's Emhart Co.—and burst open the factory's large store of plastic materials, swept them onto the curling waters and the high winds.

The confetti in the streets was really tiny colored plastic bits. All over the village sheets of plastic whipped and cracked in trees and on roofs.

Plastic pinch bottles that Plax makes, from small perfume bottle to large demijohn size, rolled and floated away up town.

PLAX STORM LOSS PUT AT $750,000

Plax Corp.'s plant at Stonington may have suffered the greatest loss of any New England concern from last Tuesday's hurricane, with preliminary estimate of damage set in excess of $750,000.

The company's entire plastic raw material inventory and most of the finished plastic bottles and plastic sheeting were washed to sea. All plastic processing machinery was more or less submerged and will have to be dismantled, cleaned,

and reassembled. The extent of damage to the machines cannot be determined until power is restored to the area, a company official said.

Additionally, the wind tore slates from the plant roof and hurled them through windows, so that the heavy rains damaged material and equipment on the building's second and third floors. The sea water was at one point at least 5 feet deep on the first floor of the building.

Senator BUSH. Sixth, I should like to include in the record a petition of Hammock Point Associates of Clinton, Conn., in this general connection.

(The above-mentioned document is as follows:)

ELMHURST 73, LONG ISLAND, NEW YORK, *March 25, 1955.*

Hon. PRESCOTT S. BUSH,
The United States Senate, Washington, D. C.

Honorable SIR: On behalf of the Hammock Point Associates of Clinton, Conn., please find enclosed petition with respect to the erosion of the shore in the area from Kelsey Point to Hammock Point.

We would kindly request that all correspondence with respect to the subject mater be sent in triplicate; the original to the chairman, Harold C. Davis, Wallingford, Conn.; duplicate to Mr. E. S. Davis, Middletown, Conn., and triplicate to me.

Thanking you for the needed attention, we are

Respectfully yours,

ANN KRONENBITTER,
Secretary, Hammock Point Associates, Clinton.

Hon. PRESCOTT S. BUSH,
The United States Senate, Washington, D. C.

We, the undersigned, agrieved and distressed, affix our names to this petition in order to seek redress from the Government of the United States as follows:

1. That we, the undersigned, are either residents or landowners or both, in the area from Kelsey Point to Hammock Point, Clinton, Conn., and as designated as such area on the Army engineers' survey map, plate 18 and division report dated June 29, 1951 (pp. 20–21), pertaining to said area.

2. That for a long time and at the present time, soil erosion in said area is rapidly destroying and washing away valuable beach and property with resulting danger to the lives, health, and property rights of the undersigned.

3. That immediate corrective steps be taken to eliminate the swift double current created by the badly designed Stoney Island breawwater built by the Federal Government and completed in 1917. Said breakwater is responsible for the accelerated erosion in this particular area under normal conditions; the hazards being multiplied under hurricane conditions.

4. That immediate aid is necessary to preserve our basic rights. To avert catastrophic property loss, the Clinton Hammock Point Associates have awarded a contract for the installation of a series of groins or jetties, construction to start in April 1955, and request Federal reimbursement.

5. That all individual and collective appeals, having heretofore been of little or no avail.

We, therefore, by petition, seek proper and immediate aid and relief from the Government of the United States.

Dated March 21, 1955.

Harold C. Davis, Chairman; Ann Kronenbitter, Secretary; Sophie K. Johnson, Secretary; Floyd E. Hough; Parter W. Pratt, for the estate of James T. Pratt, Sr.; Dorthy Brighenti Spencer; Wallace W. Willard, Trustee; Wallace W. Willard; Mrs. Rose D. Pasquale; Beatrice L. Davis; Ella R. Davis; Stanley C. Atwell; Robert O. J. McCarty; John A. Wellman; Agostino Morelli; Venice M. Bondi, not an associate in the Clinton Hammock Point Associates; Joseph V. Porano; Gertrude S. Disnlea; Douglas D. Peroy, M. D.

Senator BUSH. Seventh, I should like to insert a letter of Mr. Carl F. Bissell to Congressman Morano, suggesting piers be constructed so as to be adaptable as public fishing piers; and the letter of Colonel Fleming commenting on Mr. Bissell's suggestion, which he said had considerable merit. That is Colonel Fleming of the Army engineers.

(The above-mentioned documents are as follows:)

WOODMONT, CONN., *January 30, 1955.*

Hon. ALFRED MORANO,
Member of Congress,
House Office Building, Washington, D. C.

MY DEAR CONGRESSMAN: May I offer this suggestion for your consideration in connection with plans now being studied to establish shore-erosion-control measures along the Connecticut coastline: That wherever pier-type installations are established, perpendicular to the shoreline and connected with it, they be so constructed as to be adaptable as public fishing piers.

This would be especially desirable where the installations are made at a State park, such as Sherwood Island, and in the case of Hammonasset State Park, Madison, where the State, pending Federal approval, already has started construction in the Meigs Point section.

For several years the Bridgeport Saltwater Sports Association, the New Haven County League of Sportsmen's Clubs, and Connecticut Surfcasters, of which I am the organizer, have vainly tried to induce the State to build self-liquidating fishing piers at all three of our waterfront State parks, including Rocky Neck. It was our proposal that the cost would be met by imposing a use fee, which also would provide funds for needed marine research.

When it became evident that Federal-State shore-erosion-control projects might in some cases take the form of pier-type breakwaters, we felt these could very well be adapted to use as public fishing piers at little or no extra cost. I originated a resolution, adopted first by Connecticut Surfcasters and more recently by the New Haven County League of Sportsmen's Clubs, favoring this action. I might say here that the groups favoring this action have memberships aggregating 7,500 plus.

These piers would meet a yearly growing demand occasioned by the fact that with more and more Connecticut residents, old and young, such piers would help relieve the steadily growing pressure upon Connecticut's meager inland angling facilities.

There are no public fishing facilities at any of our three State parks, although a dangerous breakwater at Rocky Neck is used by literally thousands of adults and children throughout the summer vacation months.

I do not write as the designated representative of any of the sportsmen's groups listed above, but as an individual who, as an outdoor writer, has seen the need for these piers grow steadily during the past 30-plus years.

However, I do urge you to consider my suggestion as a valid representation of the beliefs of great numbers of your constituents, and that you initiate whatever affirmative action seems appropriate.

Respectfully,

CARL F. BISSELL.

CORPS OF ENGINEERS, UNITED STATES ARMY,
OFFICE OF THE DIVISION ENGINEER,
NEW ENGLAND DIVISION,
Boston 15, Mass., February 14, 1955.

Hon. PRESCOTT BUSH,
United States Senate, Washington, D. C.

DEAR SENATOR BUSH: Reference is made to your letter dated February 4, 1955, enclosing correspondence from Mr. Carl F. Bissell in regard to fishing piers. In the absence of Colonel Fleming, I have discussed the subject with my engineers and am pleased to furnish the following information:

Mr. Bissell's suggestion that pier-type structures in Federal beach-erosion-control projects be constructed for adaptation as public fishing piers has considerable merit. This office was cognizant of tentative State plans for construction of fishing piers at both Sherwood Island and Hammonasset State Parks when the beach-erosion-control studies were made of those areas, and consideration was given to this phase of park development. Groins included in the adopted Federal beach-erosion-control projects at each park can easily be redesigned and constructed to serve dual purposes. However, since there is no authority for Federal participation in such work, any cost incurred in construction of the groins in addition to that necessary for shore protection would have to be borne entirely by the State or local interests.

In connection with the presently scheduled construction at Hammonasset State Park, the Chief of Engineers has already approved a new design submitted by the Connecticut Public Works Department for the groin included in that project. The new design provides for raising the top elevation of the groin, which is to be a solid-fill riprap structure, so that it will be about 1 foot above the plane of mean high water. This design should make the groin usable for fishermen during low stages of the tide and, if its top elevation is raised by the addition of a suitable walk or platform, it can be used at all stages of the tide. The modified structure must be built, however, at no additional cost to the United States.

Similar design changes for structures included in other Federal beach-erosion-control projects can be initiated by the State of Connecticut or local public interests, if desired, by requesting approval therefor. Requests, if addressed to this office will be given every consideration and duly processed through the Chief of Engineers.

Sincerely yours,

J. R. THOMPSON,
Lieutenant Colonel, Corps of Engineers, Acting Division Engineer.

Senator BUSH. Eighth, I should like to include the letters dated January 20 and February 3, 1955, of Norris L. Bull, of the Federation of Old Lyme Beaches, in regard to the problems faced by private beach associations.

(The above-mentioned documents are as follows:)

THE FEDERATION OF OLD LYME BEACHES,
COUNCIL OF BEACH REPRESENTATIVES,
Old Lyme, Conn., January 20, 1955.

Senator PRESCOTT BUSH,
United States Senate, Washington, D. C.

DEAR SENATOR BUSH: From a news article in the Hartford Times of January 14, I note that you have offered a bill authorizing a survey of the New England, New York, and New Jersey coastal and tidal areas to determine how they may be protected from future hurricanes. In this connection you may be interested in the attached letter, as indicating the rising sentiment of Connecticut shore-property owners. You will note the emphasis on beach-erosion protection as the more immediate and fundamental concern, since the destructive forces of hurricane waves is due primarily to lack of barrier structures such as groins (jetties), seawalls, revetments, etc., to keep the breaking point of the waves as far as possible offshore, and to impound material that will push the breaking point seaward by counteracting the natural loss of beach sand. For this reason we hope that our representatives in Congress will work for amendment of Public Law 727 to permit Federal participation in projects for the protection from beach erosion of the privately owned beaches now open (through renting, etc.) to general public use.

We are, of course, strongly interested in the longer range program proposed for hurricane protection, which would include flood protection, I presume. We are informed that at the present time Federal authority for developing projects for hurricane protection is not clearly defined. To get such authority would require approval by Congress or a joint House-Senate resolution similar to that for navigation or flood-control projects. I am further informed that the Army engineers would like to have that authority to extend the field of their work in shore protection in the face of increasing frequency of storms of hurricane or near-hurricane proportions. Since, however, a preliminary survey for hurricane protection with the resulting works, if authorized, would take several years, it would seem that something should be done under an amendment to Public Law 727 to make reasonably sure that our shore properties will still be there when the hurricane protective measures take form.

I have requested our Congressman from the second district, Representative Horace Seely-Brown, to look into the status of H. R. 219, which would amend Public Law 727, to see whether he thinks it should be reintroduced in the present Congress, or whether a new approach may be advisable. It would be much appreciated if you will exchange views with him on this subject and cooperate in whatever manner you may mutually consider to be helpful to the cause.

Yours sincerly,

NORRIS L. BULL.

THE FEDERATION OF OLD LYME BEACHES,
COUNCIL OF BEACH REPRESENTATIVES,
Old Lyme, Conn., December 28, 1954.

To the Beach Associations of Connecticut:

Hurricane Carol of last August 31 dealt a blow to the do-nothing outlook on beach erosion. It showed how vulnerable our beaches are to the rising violence of the sea, due to loss of sand by erosion and lack of protection by groins (jetties), seawalls, and revetments. While we sleep on this problem, our shoreline is eaten away. The waves break farther inshore, with mounting property damage. The public interest suffers loss in a great recreational resource because the public laws fail to safeguard this public resource. It seems our lawmakers do not hear from enough people who are among the losers.

Publicly owned beaches get protective works when recommended by the United States Beach Erosion Board and approved by Congress, with State and local agencies cooperating. But as regards the so-called private beaches, where the public rents its summer cottages, the Federal, State, and municipal authorities have to ignore the public interest; let nature take its course through the wreckage of the beaches, because there are no laws that authorize Federal, State, and local agencies to jointly provide protective works for privately owned beaches. Yet the private beaches make available to the public a substantial part of its recreation facilities at the shore. Is it not time for beach property owners to reason with their lawmakers?

Federal aid is limited to publicly owned beaches under Public Law 727, United States Statutes at Large. (October 4, 1954.) It was pointed out by Governor Lodge that H. R. 219, under consideration by the House Committee on Public Works, would amend section 1 of Public Law 727 "to make sure Federal aid (would be) also applicable to works protecting frontage that is available to the general public at all times for recreational purposes upon equal terms and reasonable charges," thereby extending Federal aid to privately owned beaches now open to general public use * * *. Is it not the business of our associations to urge our representatives in Congress to push this overdue legislation—to preserve the beaches for all the people?

On the State and local level the Commonwealth of Massachusetts has a law authorizing its department of public works to undertake projects "for the improvement, development, maintenance, and protection * * * of tidewaters, foreshores, and shores along a public beach" in cooperation with local interests. This law has operated to great advantage in preserving the Massachusetts beaches both public and private. (See copy attached: Massachusetts General Statutes, ch. 91; Waterways.) It permits work to be done for private beaches that cannot be done with Federal aid which is restricted to publicly owned beaches under Public Law 727. The proportion of cost of protective works to be borne by the municipality or (other) local interests is usually one-half, the Commonwealth paying the other half. It is tentatively proposed that the beach associations of Connecticut sponsor a similar law for this State and support it in an organized way in the January 1955 session of the general assembly. Means of implementing such a law under our State's departmental setup are being studied.

Since the expenditures necessary for preserving our beach fronts have grown beyond the financial capacity of private owners, due to increasing frequency of destructive storms beating in on a receding shoreline, public help must be had if the private beaches are to survive. Property owners of these beaches must organize to establish this public responsibility. To get started in a unified way, it is suggested that officials of the beach associations arouse their members to call for laws permitting State and local interests jointly to provide funds for the preservation of privately owned beaches. This means concerted action to enlist the support of their State senators and representatives behind the proposed local legislation and to solicit their Senators and Representatives in Congress for the national legislation referred to.

We could plan more definitely for this work after hearing from interested beach associations, to know how many will notify their members of their personal part in influencing legislation. For this initial step will you kindly indicate whether your association may be expected to join with others in promoting our common cause? You will be further informed of developments regarding the proposed bill for the legislature. A bill would have to be filed early in February to be acted on in the 1955 session. The political groundwork should engage us now.

Faithfully yours,

NORRIS L. BULL.

COMMONWEALTH OF MASSACHUSETTS, GENERAL STATUTES

CHAPTER 91—WATERWAYS

11. *Improvement and Preservation of Rivers, Harbors, etc.*—Outside of Boston Harbor the department [1] shall undertake such work for the improvement, development, maintenance, and protection of tidal and nontidal rivers, and streams, harbors, tidewaters, foreshores, and shores along a public beach as it deems reasonable and proper, and for this purpose shall have the same powers conferred upon it by section 31. In selecting the places to do such work, the department shall consider the general public advantage of the proposed work, the local interest therein as manifested by municipal or other contributions therefor, the importance of the industrial or commercial and other interests to be especially served thereby, and any other material considerations affecting the feasibility, necessity, or advantage of the proposed work or the expenditure therefor. No work authorized by this section shall be begun until after a public hearing has been held and a survey and an estimate of the cost has been made (1909, 481, pars. 1, 2; 1919, 350, par. 113; 1931, 394, par. 60; 1950, 516).

THE FEDERATION OF OLD LYME BEACHES,
COUNCIL OF BEACH REPRESENTATIVES,
Old Lyme, Conn., February 3, 1955.

Senator PRESCOTT BUSH,
United States Senate,
Committee on Banking and Currency,
Washington, D. C.

DEAR SENATOR BUSH: Your letter of January 24 in answer to mine of January 20 is acknowledged with many thanks for your interest in the critical questions pertaining to preservation of our shore areas.

As you point out, the proposed amending of Public Law 727 to permit Federal participation in projects for the protection of privately owned beaches from natural erosion "raises serious questions of public policy which would require very careful consideration." It appears to me that they never have had quite that kind of consideration. In flood protection, irrigation and soil-conservation projects, favorable legislation has not been noticeably deterred by the prospects of benefitting privately owned property. Many feel that the fundamentals of public policy regarding beach erosion have yet to be reasoned to logical rather than political conclusions.

While it is not at all certain that I can attend a Senate hearing on your bill, S. 414, it would be a pleasure to point out some of the incongruities of Federal policy under Public Law 727, as to what constitutes the public interest or the degree of public interest in a recreational beach. Under that law Federal, State and municipal governments were empowered to share the cost of protecting publicly owned shores, by virtue of their being open to public use and benefit, but were prohibited from protecting privately owned shores also open to public use and benefit, through the renting of cottages and appurtenant facilities. There appears to be a rather fine line of discrimination in this policy.

A family unit of the vacationing public may go to a publicly owned beach; perhaps they go in a trailer, rent ground and appurtenant facilities. The beach they use is protected by governmental agencies; public funds are committed to its preservation; the family are assured of continued use of that beach. Again, they may go to a privately owned beach, rent ground and a cottage with appurtenant facilities. This beach is not protected by givernmental agencies; no public funds are committed to its preservation to assure its continued use by the vacationing family. Each major storm makes it less likely that they will continue to have the use of that beach. Their Government, it seems, is not concerned with loss of the privately owned beach; it is concerned only with loss of the publicly owned beach. The Government does not recognize that the public is as surely deprived of recreation grounds by loss of private beaches as it is by loss of public beaches. With both, we face an increasing shortage of available shore front, and the loss of private beaches would more seriously affect the shortage of vacationing facilities.

[1] Refers to the department of public works. In Connecticut, the authority to do such work would be vested in the flood-control and water-policy commission as the appropriate agency under present law.

But there are no private beaches in Connecticut, literally speaking. The State owns every beach between high water line and low water, i. e., the foreshore. The Federal Government owns from low water line seaward. That comprises about all the land there is for bathing purposes at the shore. And here we have an amazing twist in the national policy of conservation. The Federal and State Governments cannot preserve their own shores, under Public Law 727, if those shores happen to abut private property at high water line.

The beach front property owners abutting land of the State (the foreshore of every beach in the State), do not ask for protective works on their properties. They can reasonably afford to pay and should pay for protecting their own properties above high water line. But the restrictions in Public Law 727 force them, the owners above high water line, to bear all the expense of protective works built on the foreshore and offshore on land owned by the Federal Government and the State.

If we were to admit the full implications of this situation we would say that damage suffered by private property owners (by storm waves and tides) is directily inflicted upon them by uncontrolled conditions prevailing on property owned by the Federal and State Governments. Furthermore, the Federal and State Governments, by their refusal to cooperate financially with private property owners, compel the latter to bear all of the costs of ameliorating the conditions permitted to exist on public property of the Federal Government and the State. Some thinking along this line should be salutary—without going so far as to think that Congress now or ever will accept the implications as a responsibility.

One aspect of enlightened public policy should be, I think, to encourage private property owners to intitiate improvements of their beaches (foreshores not theirs), before their local situations may come to involve prohibitive expense or irreplaceable property losses. The amending of Public Law 727, as advocated, would encourage the beach associations to save their shores and that would be essentially in the public interest. Without the cooperation of the beach associations, a major portion of desirable frontage will be lost. It is evident at this stage of the loss by erosion that shore protection is basically one job; that all of the recreational beach front of the State must be saved if the area is to be adequate to the needs of the people. Its developed portions are not adequate even now, as is shown by the demand for seasonal shore rents and by the crowding of the public beaches. Any realistic program of beach preservation would have to include those sections owned by the State, those owned by municipalities and subdivisions thereof, those owned by chartered associations and by voluntary improvement associations. In the latter categories are the so-called private interests, inseparably linked with the public interests by a continuous State-owned foreshore, by the renting or recreation facilities and by the technical requirements of interrelated offshore structures in coastline protective planning, particularly for hurricanes.

Authorizations of surveys preliminary to planning prevention of hurricane damage, as proposed in bill S. 414, have to be voted a long time before plans materialize in protective works. Unless Public Law 727 be broadened before that, unless existing plans can be executed, instead of actual projects we may expect academic postmortems. As concerns Connecticut, the survey by the Army engineers completed in 1952 with recommendations relative to each beach, specifies the immediate needs at threatened locations. If we should have to wait for hurricane-protective works—enormously more extensive and expensive—would it not be prudent to pull up stakes on the threatened beaches and thereby satisfy the requirements of public policy, as it stands?

These are some thoughts I would like to submit to the Senate Committee on Public Works, and should I not have the opportunity to do so, you may not be averse to voicing them as views of constituents.

Yours sincerely,

NORRIS L. BULL.

Senator BUSH. Ninth, I should like to include the letter of Colonel Fleming dated March 3, 1955, with enclosures outlining the present state of law and tabulations of shore protection projects in Connecticut and flood control projects in the Connecticut River Basin.

(The above-mentioned document is as follows:)

CORPS OF ENGINEERS, UNITED STATES ARMY,
OFFICE OF THE DIVISION ENGINEER,
NEW ENGLAND DIVISION,
Boston 15, Mass., March 3, 1955.

Hon. PRESCOTT BUSH,
United States Senate, Washington, D. C.

DEAR SENATOR BUSH: I appreciated the opportunity to discuss with you the problem of shore erosion and your interest in securing legislation necessary to authorize the Corps of Engineers to conduct a hurricane survey along the North Atlantic coast. I am enclosing several memoranda summarizing shore erosion and flood-control legislation. The history of flood-control legislation is involved and the memoranda are rather lengthy. I have also inclosed a tabulation of shore protection projects in Connecticut and flood-control projects in the Connecticut River Basin together with estimates of costs and non-Federal contributions.

With respect to shore protection, a study of the legislation and administrative rulings relative to Federal participation indicates that under present Federal law, funds would not be available to restore and protect Connecticut shores on the sole basis of State ownership of the shore to the high-water level. Ownership alone is insufficient to determine the necessary public character of the land. Free and unrestricted access to the general public is also required.

In Connecticut, ownership of the shore to high water appears to rest with the State subject to certain rights of the abutting owner. In those cases where the abutting land is owned by the State or political subdivision and is freely accessible to the general public, Federal participation is possible under present law. The typical beach of a public nature for which there has been a precedent for Federal participation, however, is one where the abutting land has been set aside by local authorities or by the State as a public park or a beach area owned by the Government. In any case where the abutting land is owned by private interest or access by the general public is in any way wholly or partially restricted, the shore could not be considered as falling within the present statute.

As you are undoubtedly aware, H. R. 31 recently introduced into Congress would authorize Federal participation in the cost of protecting the shore of private as well as publicly owned real property. Such legislation if passed would, of course, permit the application of Federal funds to protect the shore where the ownership is similar to that in Connecticut.

Congress has declared that flood control on navigable waters and their tributaries is a proper activity of the Federal Government in cooperation with States and their political subdivisions. Up to 1953, the Federal Government financed the entire cost of flood control reservoirs and the construction cost for local protective works. Local communities were called upon to furnish all lands, rights-of-ways and easements required for local improvements. Under present flood control policy, the Federal Government finances the entire cost of flood control reservoirs and pays a substantial part of the cost of local protective works. The amount of the contribution to be made by local communities for flood protection work such as dikes and flood walls is dependent upon the character of the project. Where they are distinctly of a local character, contributions are as large as 50 percent of the project cost and must be paid by the community benefiting. I have made some figures on the local contribution that might be required from the town of Fairfield should the proposed flood protection works be constructed. The project construction cost is roughly $500,000 and lands and damages would amount to about $50,000. The current method employed by the Corps of Engineers in apportioning costs would require local interests to pay for the lands and damages and contribute about $100,000 to the cost of the project. However, the Bureau of Budget is proposing a new method of apportioning costs and should it be adopted, the total costs of the Fairfield project would be bourne equally by the Federal Government and the town.

You will be interested to know that the study of the entire Connecticut shore line is drawing to a close. Reports for areas 9, 8, 11, and 10 are scheduled for completion on March 31, August 31, and December 31, respectively. Area 9 includes the shores of East Haven, Branford, and most of Guilford; areas 8 and 11, the shores of Greenwich, Stamford, Darien, and Norwalk; and area 10, the shore of Waterford.

I look forward to attending the conference which you and Governor Ribicoff have arranged for April 2 at Clinton, and to discussing these matters further with you at that time. If I can be of further assistance before that date, please let me know.

Very sincerely yours,

ROBERT J. FLEMING, JR.,
Colonel, Corps of Engineers, Division Engineer.

SUMMARY OF GENERAL FLOOD CONTROL LEGISLATION

The Flood Control Act approved June 22, 1936, contains a declaration of policy on flood control by Congress. This act, as modified and supplemented by subsequent acts, principally those approved June 28, 1938, and December 22, 1944, defines the Federal interest and responsibilities for improvements for flood control and allied purposes. Pertinent sections of these acts are inclosed and a brief resume of the salient points of the policy follows:

The Flood Control Act of 1936 stated: That flood control on navigable waters and their tributaries is a proper activity of the Federal Government in cooperation with States, their political subdivisions, and localities thereof and that the Federal Government should improve or participate in improvement of navigable waters or their tributaries for flood control purposes if the benefits are in excess of estimated costs, and if the lives and social security of people are otherwise adversely affected. That Federal investigations and improvements for flood control and allied purposes shall be under the jurisdiction of the War Department, under direction of the Secretary of War and supervision of the Chief of Engineers, and investigations and measures for runoff and waterflow retardation and soil erosion prevention shall be under the jurisdiction of and prosecuted by the Department of Agriculture under the direction of the Secretary of Agriculture. That no money shall be expended on construction of any project until States, political subdivisions or other local agencies have given assurances that they will (1) provide without cost to the United States all lands, easements, and rights-of-way necessary for construction; (2) hold and save the United States free from damages due to the construction; and (3) maintain and operate all the works after completion in accordance with regulations prescribed by the Secretary of War.

The Flood Control Act of 1938 amended the policy and authorized the Secretary of War to acquire in the name of the United States title to all lands, easements, and rights-of-way necessary for any dam and reservoir project or channel improvement or channel rectification project for flood control.

The Flood Control Act of 1944 declared it to be the policy of the Congress to recognize the interests and rights of the States in determining the development of watersheds within their borders. In conformity with this policy the act directs that plans, proposals, or reports of the Chief of Engineers for flood control shall be submitted to Congress only upon compliance with the following provisions. Investigations which form the basis of plans, proposals, or reports shall be conducted in such a manner as to give the affected State or States information developed during the course of the investigations, opportunity for consultation regarding plans and proposals and opportunity to cooperate in the investigations. The Chief of Engineers shall transmit a copy of his proposed report to each affected State, and within 90 days from date of receipt the written views and recommendations of each affected State may be submitted to the Chief of Engineers. The views and recommendations of affected States shall be submitted to the Congress at the time of submission of the proposed report, and will be printed as part of the House or Senate document. This act requires that assurances of local cooperation shall be furnished for channel improvement and channel rectification projects in accordance with provisions of the Flood Control Act of 1936.

CONSTRUCTION OF PROJECTS NOT SPECIFICALLY AUTHORIZED

In addition to construction of projects specifically authorized by Congress the Secretary of the Army has been granted authority to allot funds for construction of projects not specifically authorized, as follows: The Flood Control Act approved August 28, 1937 as amended by acts approved July 24, 1946, and September 3, 1954, authorizes the Secretary of the Army to allot funds not to exceed $2 million for any one fiscal year for removing accumulated snags and other debris and clearing and straightening the channels in navigable streams

and tributaries thereof when, in the opinion of the Chief of Engineers, such work is advisable in the interest of flood control, provided not more than $100,000 shall be expended for this purpose for any single tributary from the appropriations for any one fiscal year. The Flood Control Act approved June 30, 1948, as amended by the Flood Control Act approved May 17, 1950, authorizes the Secretary of the Army to allot funds not to exceed $3 million for any one fiscal year for the construction of small flood control projects not specifically authorized by Congress, and not within areas intended to be protected by projects so authorized, when, in the opinion of the Chief of Engineers, such work is advisable, provided that not more than $150,000 shall be allotted for this purpose at any single locality from the appropriations for any one fiscal year, provided local interests furnish assurances of cooperation as required by the Flood Control Act of 1936 and provided further that the work shall be complete in itself and not commit the Government to any additional improvement to insure its successful operation, except as may result from the normal procedure applying to projects authorized after submission of preliminary examination and survey reports.

FLOOD CONTROL ACTS

The Flood Control Act approved June 22, 1936, contains a declaration of policy on flood control by Congress as follows:

"[PUBLIC—No. 738—74TH CONGRESS]

"DECLARATION OF POLICY

"Section 1. It is hereby recognized that destructive floods upon the rivers of the United States, upsetting orderly processes and causing loss of life and property, including the erosion of lands, and impairing and obstructing navigation, highways, railroads, and other channels of commerce between the States, constitute a menace to national welfare; that it is the sense of Congress that flood control on navigable waters or their tributaries is a proper activity of the Federal Government in cooperation with States, their political subdivisions, and localities thereof; that investigations and improvements of rivers and other waterways, including watersheds thereof, for flood-control purposes are in the interest of the general welfare; that the Federal Government should improve or participate in the improvement of navigable waters or their tributaries, including watersheds thereof, for flood-control purposes if the benefits to whomsoever they may accrue are in excess of the estimated costs, and if the lives and social security of people are otherwise adversely affected.

"SEC. 2. That, hereafter, Federal investigations and improvements of rivers and other waterways for flood control and allied purposes shall be under the jurisdiction of and shall be prosecuted by the War Department under the direction of the Secretary of War and supervision of the Chief of Engineers, and Federal investigations of watersheds and measures for runoff and waterflow retardation and soil erosion prevention on watersheds shall be under the jurisdiction of and shall be prosecuted by the Department of Agriculture under the direction of the Secretary of Agriculture, except as otherwise provided by Act of Congress; and that in their reports upon examinations and surveys, the Secretary of War and the Secretary of Agriculture shall be guided as to flood-control measures by the principles set forth in section 1 in the determination of the Federal interests involved: *Provided*, That the foregoing grants of authority shall not interfere with investigations and river improvements incident to reclamation projects that may now be in progress or may be hereafter undertaken by the Bureau of Reclamation of the Interior Department pursuant to any general or specific authorization of law.

"SEC. 3. That hereafter no money appropriated under authority of this Act shall be expended on the construction of any project until States, political subdivisions thereof, or other responsible local agencies have given assurances satisfactory to the Secretary of War that they will (a) provide without cost to the United States all lands, easements, and rights-of-way necessary for the construction of the project, except as otherwise provided herein; (b) hold and save the United States free from damages due to the construction works; (c) maintain and operate all the works after completion in accordance with regulations prescribed by the Secretary of War: *Provided*, That the construction of any dam authorized herein may be undertaken without delay when the dam site has been acquired and the assurances prescribed herein have been furnished,

without awaiting the acquisition of the easements and rights-of-way required for the reservoir area: *And provided further*, That whenever expenditures for lands, easements, and rights-of-way by States, political subdivisions thereof, or responsible local agencies for any individual project or useful part thereof shall have exceeded the present estimated construction cost therefor, the local agency concerned may be reimbursed one-half of its excess expenditures over said estimated construction cost: *And provided further*, That when benefits of any project or useful part thereof accrue to lands and property outside of the State in which said project or part thereof is located, the Secretary of War with the consent of the State wherein the same are located may acquire the necessary lands, easements, and rights-of-way for said project or part thereof after he has received from the States, political subdivisions thereof, or responsible local agencies benefited the present estimated cost of said lands, easements, and rights-of-way, less one-half the amount by which the estimated cost of these lands, easements, and rights-of-way exceeds the estimated construction cost corresponding thereto: *And provided further*, That the Secretary of War shall determine the proportion of the present estimated cost of said lands, easements, and rights-of-way that each State, political subdivision thereof, or responsible local agency should contribute consideration for the benefits to be received by such agencies: *And provided further*, That whenever not less than 75 per centum of the benefits as estimated by the Secretary of War of any project or useful part thereof accrue to lands and property outside of the State in which said project or part thereof is located, provision (c) of this section shall not apply thereto; nothing herein shall impair or abridge the powers now existing in the Department of War with respect to navigable streams: *And provided further*, That nothing herein shall be construed to interfere with the completion of any reservoir or flood-control work authorized by the Congress and now underway.

"SEC. 4. The consent of Congress is hereby given to any two or more States to enter into compacts or agreements in connection with any project or operation authorized by this Act for flood control or the prevention of damage to life or property by reason of floods upon any stream or streams and their tributaries which lie in two or more such States, for the purpose of providing, in such manner and such proportion as may be agreed upon by such States and approved by the Secretary of War, funds for construction and maintenance, for the payment of damages, and for the purchase of rights-of-ways, lands, and easements in connection with such project or operation. No such compact or agreement shall become effective without the further consent or ratification of Congress, except a compact or agreement which provides that all money to be expended pursuant thereto and all work to be performed thereunder shall be expended and performed by the Department of War, with the exception of such reasonable sums as may be reserved by the States entering into the compact or agreement for the purpose of collecting taxes and maintaining the necessary State organizations for carrying out the compact or agreement."

The Flood Control Act approved June 28, 1938 amended and modified the policy quoted above as follows:

"[Public—No. 761—75th Congress]

"SEC. 2. That section 3 of the Act of June 22, 1936 (Public, Numbered 738, Seventy-fourth Congress), as heretofore amended and as herein further modified, shall apply to all flood-control projects, except as otherwise specifically provided by law.

"That in case of any dam and reservoir project, or channel improvement or channel rectification project for flood control, herein authorized or heretofore authorized by the Act of June 22, 1936 (Public, Numbered 738, Seventy-fourth Congress) as amended, and by the Act of May 15, 1928 (Public Numbered 391, Seventieth Congress) as amended by the Act of June 15, 1936 (Public, Numbered 678, Seventy-fourth Congress), as amended, title to all lands, easements, and rights-of-way for such project shall be acquired by the United States or by States, political subdivisions thereof or other responsible local agencies and conveyed to the United States, and provisions (a), (b), and (c) of section 3 of said Act of June 22, 1936, shall not apply thereto. Notwithstanding any restrictions, limitations, or requirement of prior consent provided by any other Act, the Secretary of War is hereby authorized and directed to acquire in the name of the United States title to all lands, easements, and rights-of-way necessary for any dam and

reservoir project or channel improvement or channel rectification project for flood control, with funds heretofore or hereafter appropriated or made available for such projects, and States, political subdivisions thereof, or other responsible local agencies, shall be granted and reimbursed, from such funds, sums equivalent to actual expenditures deemed reasonable by the Secretary of War and the Chief of Engineers and made by them in acquiring lands, easements, and rights-of-way for any dam and reservoir project, or any channel improvement or channel rectification project for flood control heretofore or herein authorizd: *Provided*, That no reimbursement shall be made for any direct or speculative damages: *Provided further*, That lands, easements and rights-of-way shall include lands on which dams, reservoirs, channel improvements, and channel rectifications are located; lands or flowage rights in reservoirs and highway, railway, and utility relocation.

"SEC. 3. That in any case where the construction cost of levees or flood walls included in any authorized project can be substantially reduced by the evacuation or a portion or all of the area proposed to be protected and by the elimination of that portion or all of the area from the protection to be afforded by the project, the Chief of Engineers may modify the plan of said project so as to eliminate said portion or all of the area: *Provided*, That a sum not substantially exceeding the amount thus saved in construction cost may be expended by the Chief of Engineers, or in his discretion may be transferred to any other appropriate Federal agency for expenditure, toward the evacuation of the locality eliminated from protection and the rehabilitation of the persons so evacuated: *And provided further*, That the Chief of Engineers may, if he so desires, enter into agreement with States, local agencies, or the individuals concerned for the accomplishment by them, of such evacuation and rehabilitation and for their reimbursement from said sum for expenditures actually incurred by them for this purpose."

The Flood Control Act approved December 22, 1944 further amended the policy as follows:

[Public Law 534—78th Congress]

"*Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled*, In connection with the exercise of jurisdiction over the rivers of the Nation through the construction of works of improvement, for navigation or flood control, as herein authorized, it is hereby declared to be the policy of the Congress to recognize the interests and rights of the States in determining the development of the watersheds within their borders and likewise their interests and rights in water utilization and control, as herein authorized to preserve and protect to the fullest possible extent established and potential uses, for all purposes, of the waters of the Nation's rivers; to facilitate the consideration of projects on a basis of comprehensive and coordinated development; and to limit the authorization and construction of navigation works to those in which a substantial benefit to navigation will be realized therefrom and which can be operated consistently with appropriate and economic use of the waters of such rivers by other users.

"In conformity with this policy:

"(a) Plans, proposals, or reports of the Chief of Engineers, War Department, for any works of improvement for navigation or flood control not heretofore or herein authorized, shall be submitted to the Congress only upon compliance with the provisions of this paragraph (a). Investigations which form the basis of any such plans, proposals or reports shall be conducted in such a manner as to give to the affected State or States, during the course of the investigations, information developed by the investigations and also opportunity for consultation regarding plans and proposals, and, to the extent deemed practicable by the Chief of Engineers, opportunity to cooperate in the investigations. If such investigations in whole or in part are concerned with the use or control of waters arising west of the ninety-seventh meridian, the Chief of Engineers shall give to the Secretary of the Interior, during the course of the investigations, information developed by the investigations and also opportunity for consultation regarding plans and proposals, and to the extent deemed practicable by the Chief of Engineers, opportunity to cooperate in the investigations. The relations of the Chief of Engineers with any State under this paragraph (a) shall be with the Governor of the States or such official or agency of the State as the Governor may designate. The term 'affected State or States' shall include those in which the works or any part thereof are proposed to be located; those which in whole or part are both

within the drainage basin involved and situated in a State lying wholly or in part west of the ninety-eighth meridian; and such of those which are east of the ninety-eighth meridian as, in the judgment of the Chief of Engineers, will be substantially affected. Such plans, proposals, or reports and related investigations shall be made to the end, among other things, of facilitating the coordination of plans for the construction and operation of the proposed works with other plans involving the waters which would be used or controlled by such proposed works. Each report submitting any such plans or proposals to the Congress shall set out therein, among other things, the relationship between the plans for construction and operation of the proposed works and the plans, if any, submitted by the affected States and by the Secretary of the Interior. The Chief of Engineers shall transmit a copy of his proposed report to each affected State, and, in case the plans or proposals covered by the report are concerned with the use or control of water which rise in whole or in part west of the ninety-seventh meridian, to the Secretary of the Interior. Within ninety days from the date of receipt of said proposed report, the written views and recommendations of each affected State and of the Secretary of the Interior may be submitted to the Chief of Engineers. The Secretary of War shall transmit to the Congress, with such comments and recommendations as he deems appropriate, the proposed report together with the submitted views and recommendations of affected States and of the Secretary of the Interior. The Secretary of War may prepare and make said transmittal any time following said ninety-day period. The letter of transmittal and its attachments shall be printed as a House or Senate document.

"(b) The use for navigation, in connection with the operation and maintenance of such works herein authorized for construction, of waters arising in States lying wholly or party west of the ninety-eighth meridian shall be only such use as does not conflict with any beneficial consumptive use, present or future, in States lying wholly or partly west of the ninety-eighth meridian, of such waters for domestic, municipal, stock water, irrigation, mining, or industrial purposes.

"(c) The Secretary of the Interior, in making investigations of and reports on works for irrigation and purposes incidental thereto shall, in relation to an affected State or States (as defined in paragraph (a) of this section), and to the Secretary of War, be subject to the same provisions regarding investigations plans, proposals, and reports as prescribed in paragraph (a) of this section for the Chief of Engineers and the Secretary of War. In the event a submission of views and recommendations, made by an affected State or by the Secretary of War pursuant to said provisions, sets forth objections to the plans or proposals covered by the report of the Secretary of the Interior, the proposed works shall not be deemed authorized except upon approval by an Act of Congress; and subsection 9 (a) of the Reclamation Project Act of 1939 (53 Stat. 1187) and subsection 3 (a) of the Act of August 11, 1939 (53 Stat. 1418), as amended, are hereby amended accordingly.

"SEC. 2. That the words 'flood control' as used in section 1 of the Act of June 22, 1936, shall be construed to include channel and major drainage improvements, and that hereafter Federal investigations and improvements of rivers and other waterways for flood control and allied purposes shall be under the jurisdiction of and shall be prosecuted by the War Department under the direction of the Secretary of War and supervision of the Chief of Engineers, and Federal investigations of watersheds and measures for runoff and waterflow retardation and soil-erosion prevention on watersheds shall be under the jurisdiction of and shall be prosecuted by the Department of Agriculture under the direction of the Secretary of Agriculture except as otherwise provided by Act of Congress.

"SEC. 3. That section 3 of the Act approved June 22, 1936 (Public, Numbered 738, Seventy-fourth Congress), as amended by section 2 of the Act approved June 28, 1938 (Public, Numbered 761 Seventy-fifth Congress), shall apply to all works authorized in this Act, except that for any channel improvement or channel rectification project provisions (a), (b), and (c) of section 3 of said Act of June 22, 1936, shall apply thereto, and except as otherwise provided by law: *Provided*, That the authorization for any flood-control project herein adopted requiring local cooperation shall expire five years from the date on which local interests are notified in writing by the War Department of the requirements of local cooperation, unless said interests shall within said time furnish assurances satisfactory to the Secretary of War that the required cooperation will be furnished."

CONNECTICUT RIVER FLOOD CONTROL LEGISLATION

Authorization.—The original authorization for a survey of the Connecticut River Basin was contained in River and Harbor Act approved January 21, 1927, which authorized surveys in accordance with House Document No. 308, 69th Congress, 1st session. The report on that survey, published as House Document No. 412, 74th Congress, 2d session, recommended construction of 10 reservoirs in Vermont and New Hampshire. Authorization for construction of the reservoirs was contained in the Flood Control Act of 1936. This authorization was amended by Public No. 111, 75th Congress, 1st session, which removed the restriction limiting the locations of reservoirs to the States of Vermont and New Hampshire. At that time, the States or political subdivisions thereof were required to furnish all lands, easements, and rights-of-way necessary for construction of the reservoirs, hold and save the United States free from damages due to the construction works, and maintain and operate all the works after completion.

The Committee on Flood Control of the House of Representatives, on March 27, 1936, requested a report on results of additional studies and investigations developed as a result of the great flood of 1936. Upon completion of this review a revised comprehensive plan, consisting of 20 reservoirs and local protection projects at 7 localities, was recommended in House Document 455, 75th Congress, 2d session. This revised plan was approved by the 1938 Flood Control Act, which also provided that the Federal Government acquire title to all lands, easements, and rights-of-way necessary for construction of the reservoirs, and maintain and operate reservoirs after completion.

As a result of the 1938 flood the Committee on Flood Control of the House of Representatives passed a resolution requesting a review of previous reports with a view to determining whether any modifications in the approved plan were advisable. A first interim report on this review, printed in House Document 653, 76th Congress, 3d session, considered essential modifications of the authorized project for local works for the protection of 7 cities along the Connecticut River in Connecticut and Massachusetts. A second interim report, published as House Document 724, 76th Congress, 3d session, considered changes in certain features of the approved general reservoir plan and additional local protective works. The final report has not been submitted. Modification of the comprehensive plan as recommended in the interim reports was authorized by the 1941 Flood Control Act, which also authorized such further modifications in the plan as may be found justifiable in the discretion of the Secretary of War and the Chief of Engineers.

The Flood Control Act of 1950 authorized a preliminary examination and survey for flood control and allied purposes on the Connecticut River and its tributaries where power development appears feasible and practicable to determine the hydroelectric potentialities, in combination with other water and resource development. This survey is being combined with the comprehensive interagency survey of the resources of the New England-New York region directed by the President in his letter of October 9, 1950, to the Secretary of the Army and other Federal agencies.

Compacts.—Subsequent to authorization of the initial plan for construction of reservoirs in the Connecticut River Basin, the four States concerned entered into a compact to provide a common agency to acquire lands, easements, and rights-of-way necessary for construction of reservoirs; hold and save the United States free from damages due to the construction works; and maintain and operate the works after completion. The compact was submitted to Congress for approval on June 30, 1937, but was not approved.

The consent and approval of Congress were granted on June 6, 1953 (Public Law 52, 83d Cong.), to a second compact between the States of Massachusetts, Connecticut, New Hampshire, and Vermont. The principal purpose of this compact is to provide a common agency through which the signatory States may more effectively cooperate in accomplishing the objectives of flood control and water resources utilization, and through which the downstream States may reimburse the upstream States for taxes lost by reason of ownership by the United States of lands, rights-of-way, or other property.

Authorization data

ACT AND DOCUMENT	WORK AUTHORIZED
Flood Control Act approved June 22, 1936 (H. Doc. 412, 74th Cong., 2d sess.), as amended by Public, No. 111, 75th Congress, approved May 25, 1937.	Construction of 10 reservoirs on tributaries of the Connecticut River.
Flood Control Act approved June 28, 1938 (H. Doc. 455, 75th Cong., 2d sess.).	Comprehensive plan consisting of 20 reservoirs and local protection works at 7 localities.
Flood Control Act approved August 18, 1941 (H. Docs. 653 and 724, 76th Cong., 3d sess.).	Modification of comprehensive plan and protective works at three localities.

In addition to authorizations listed above for the comprehensive plan, the following authorizations apply to individual units of the plan.

ACT AND DOCUMENT	WORK AUTHORIZED
River and Harbor Act, approved August 30, 1935 (special survey).	Dikes, drainage gates, suitable pumping plants and other facilities at East Hartford, Conn.[1]
Public, No. 859, 76th Cong. (H. Doc. 653, 76th Cong., 3d sess.).	Local protection works at East Hartford, Conn.
Public Law 759, 77th Cong. (H. Doc. 804, 77th Cong., 2d sess.).	Modified project for flood control in Connecticut River Basin to include Gully Brook Conduit, Hartford, Conn.
Flood Control Act, approved December 22, 1944.	Authorized construction of eight reservoirs in the West River Basin in Vermont instead of flood-control reservoir authorized at Williamsville, subject to modification by agreement between Vermont State Water Conservation Board, the Secretary of war, and the Chief of Engineers. Requires consultation with States prior to construction of authorized projects at Cambridgeport, Ludlow, South Tunbridge, and Gaysville.
	Nullified authorization for project at Sugar Hill site.
Flood Control Act, approved May 17, 1950.	Modified authorized project at Hartford, Conn., to include Folly Brook dike and conduit.
Flood Control Act, approved September 3, 1954.	Modified plan for flood control in Connecticut River Basin to provide for construction of a flood-control reservoir on Otter Brook at South Keene, N. H., in lieu of any reservoir or reservoirs heretofore authorized.
	Modified plan for West River Basin of the Connecticut River in Vermont to consist of 3 reservoirs at the Ball Mountain, the Island and Townshend sites, in lieu of the plan of 8 reservoirs authorized in Flood Control Act of 1944.

Summary of General Shore Protective Legislation

Public Law 520, 71st Congress, (River and Harbor Act of July 3, 1930) section 2, and subsequent acts, principally those approved July 31, 1945, and August 13, 1946, define the Federal interest and responsibilities for the study of beach erosion and shore protection problems, and the authority for Federal participation in the cost of protecting the shores of publicly owned property.

[1] This project was abandoned by the Flood Control Act of June 28, 1938.

PROVISION FOR COOPERATIVE STUDIES

Public Law 520 provided the authority for the Chief of Engineers, under the direction of the Secretary of War, to undertake investigations and studies, in cooperation with the various States, to determine effective means of preventing erosion of the shores of coastal and lake waters by waves and currents. This act stipulated that the necessary Federal expenses of such studies should be paid from the funds appropriated for examinations, surveys, and contingencies for rivers and harbors. That information obtained from such studies should be released to the appropriate State agencies prior to formal transmittal to Congress. That no Federal funds for such studies should be expended in any State which did not provide for cooperation and contribute to the study such funds and/or services as were deemed appropriate by the Secretary of War.

The term "appropriate agencies of the various States" is construed to include any State government or political unit or subdivision whose powers under the laws of the State include investigative or study functions related to coastal erosion or protection. By Executive ruling, the agency applying for an investigation of any specific locality is required to contribute 50 percent of the estimated cost of the investigation. This contribution may be either in funds or services, as deemed appropriate and required. Such studies result in a report containing plans and specific recommendations to improve or remedy a condition at a particular locality.

PROVISION FOR GENERAL INVESTIGATIONS

Public Law 166, 79th Congress, authorizes the Chief of Engineers, through the Beach Erosion Board, to make general investigations with a view to preventing erosion of the shores of the United States by waves and currents and determining the most suitable methods of protection, restoration, and development of beaches. These general studies are for the purpose of developing or determining physical phenomena, techniques, principles, and procedures related to the protection, restoration and development of beaches and shores. They are intended to provide the technical knowledge to assist in arriving at sound, economical solutions of shore erosion problems generally. They do not result in the formulation of specific plans of protection or remedial works for a particular locality, since a separate study is required to develop such plans for each locality. General investigations of the nature provided by this act are federally financed and are initiated by the Chief of Engineers through the Beach Erosion Board.

PROVISION FOR FEDERAL PARTICIPATION IN THE COST OF PROTECTING THE SHORES OF PORLICLY OWNED PROPERTY

Public Law 727 provides that the United States will assist in the construction but not in the maintenance of works for the improvement and protection against erosion by waves and currents of the shores of the United States, where such shores are owned by States, municipalities, or other political subdivisions, and when the purpose is the preventing of damage to public property and the encouragement of the healthful recreation of the people. The act stipulates: That the Federal contribution toward the construction of protective works shall not exceed one-third of the total cost. That Federal contribution to the repair of a sea wall previously constructed by a political subdivision for the purpose of protecting a public highway shall not exceed one-third of the original cost of such wall. And that the Federal contribution shall be only for plans specifically adopted and authorized by Congress after investigations and study by the Beach Erosion Board.

APPLICATION OF PUBLIC LAW 727 TO CONNECTICUT

In Connecticut, ownership of the shore to high water is in the State, subject to the following rights:

(1) In the owner of the upland, in wharfing out to connect with a navigable channel; (2) In the owner, of reclaiming flats, but not of selling the sands in the shore; and (3) In the general public, of collecting seaweed, shellfish, and for bathing or fishing. Although Public Law 727 does not define the area included by the word "shore," inasmuch as the act defines the purpose of protection as being "preventing damage to public property and promoting and encouraging the healthful recreation of the people," it is taken to apply only to those areas where the upland above high water is owned by the State or political subdivision. It is presumed that "public property" would be located on the upland. "Public"

is legally defined as "pertaining to a State, Nation, or whole community." Further, it would be difficult to visualize an area to provide "healthful recreation" unless there were convenient access on the upland to the beach. The word "people" denotes the public at large, and not merely a segment of it. The typical beach of a public nature is one where the upland has been set aside by the local authorities or the State as a park or a beach area, owned by the local government.

In view of this, ownership of the beach alone does not determine the public character. Hence, a beach where the upland is owned by private interests, and where access is restricted as to the general public, or where only limited access is available, cannot be considered as falling within the provision of Public Law 727.

PERTINENT DATA

Projects in comprehensive system, Connecticut River Basin

COMPLETED OR SUBSTANTIALLY COMPLETE

Project	Estimate of Federal cost 1954	Estimate of non-Federal costs
Reservoirs:		
Union Village, Vt	$4,006,000	
Surry Mountain, N. H	1,731,000	
Birch Hill, Mass	4,237,000	
Tully, Mass	1,548,000	
Knightville, Mass	3,207,000	
Local protection works:		
Northampton, Mass	960,000	$150,000
Holyoke, Mass	3,418,000	174,400
Springdale, Mass	700,000	57,000
Riverdale, Mass	1,138,000	75,000
West Springfield, Mass	1,579,000	30,000
Springfield, Mass	932,000	277,400
East Hartford, Conn	2,135,500	277,600
Winsted, Conn	172,000	30,000
PARTIALLY COMPLETE		
Local protection works:		
Chicopee, Mass	$1,738,000	$250,400
Hartford, Conn	6,760,000	2,732,000
CONSTRUCTION NOT STARTED		
Reservoirs:		
Victory, Vt	$4,600,000	
Gaysville, Vt	16,900,000	
South Tunbridge, Vt	5,400,000	
North Hartland, Vt	9,650,000	
Ludlow, Vt	5,690,000	
North Springfield, Vt	9,260,000	
Brockway, Vt	10,700,000	
Cambridgeport, Vt	5,170,000	
The Island, Vt	3,310,000	
Ball Mountain, Vt	15,300,000	
Townshend, Vt	10,200,000	
Alternate for Sugar Hill Reservoir, N. H.[1]	(1)	
West Canaan, N. H	9,060,000	
Claremont, N. H	13,000,000	
Honey Hill, N. H	4,060,000	
Otter Brook, N. H	4,800,000	
Barre Falls, Mass	2,500,000	
West Brookfield, Mass	8,990,000	

[1] Not yet selected.

Connecticut beach improvement project approved by Congress for Federal participation

Location	Estimated first cost [1]	Federal share	Non-Federal share
Jennings Beach and Ash Creek, Fairfield [2]	$44,000	$14,700	$29,300
Sasco Hill Beach, Fairfield	63,000	21,000	42,000
Southport Beach, Fairfield	42,000	14,000	28,000
Burial Hill Beach, Westport	24,000	8,000	16,000
Sherwood Island State Park, Westport	475,000	158,300	316,700
Compo Beach, Westport	165,000	55,000	110,000
Hammonasset Beach, Madison [3]	500,000	167,000	333,000
Middle Beach, Madison	61,400	20,400	41,000
Prospect Beach, West Haven	282,000	84,600	197,400
Woodmont Shore, Milford	181,900	42,400	139,500
Gulf Beach, Milford	39,300	13,100	26,200
Silver, Myrtle, Walnut, Laurel, and Cedar Beaches, and Meadows End, Milford	549,000	18,300	530,700
Short Beach, Stratford	79,500	26,500	53,000
Seaside Park, Bridgeport	357,000	119,000	238,000

[1] 1953–54 cost estimates.
[2] Work completed. Appropriation authorized by Congress.
[3] Work in progress. No appropriation authorized.

The only appropriation as yet made by Congress is that of $14,700 for the work at Jennings Beach and Ash Creek, Fairfield.

Senator COTTON. Mr. Chairman.

Senator BUSH. Senator Cotton.

Senator COTTON. May I have the Chair's consent to the insertion of a letter which is on its way down here either addressed to the clerk of the committe or to you or to me, or to the chairman, from his excellency, Lane Dwinell, Governor of New Hampshire?

Senator BUSH. Without objection, that will be inserted in the record.

(The above-mentioned letter is as follows:)

STATEMENT MADE BY HIS EXCELLENCY, GOV. LANE DWINELL, STATE OF NEW HAMPSHIRE, IN REGARD TO SENATE BILL 414

After experiencing Hurricanes Carol, Hazel, and Edna in rapid succession during 1954, we are all hurricane conscious, and justly so. I am heartily in favor of any survey or study that promises to prevent or minimize loss of life, and damage to public and private property from future hurricanes.

It is believed that the study should include improvement of advance weather forecasting, particularly in relation to localizing reports so that preventive measures can be taken in regard to protection of the public as well as safeguarding property.

It is further recommended that the study establish rules or standards that owners of private property may undertake for their own protection.

The provision of better protection of the coastlines and beaches by means of seawalls, jetties, or other construction, and providing safe anchorages for small craft is of paramount importance in minimizing property damage and will have a direct bearing on the saving of human lives.

Senator BUSH. Would any member of the committee wish to comment?

Senator SYMINGTON. I have no comment.

Senator BUSH. Senator Cotton, would you wish to comment?

Senator COTTON. I am deeply interested in the bill as a New England Senator, but I would prefer to withhold comments and listen to the evidence.

Senator BUSH. Senator Saltonstall is not here. We have here representing Governor Ribicoff, of Connecticut, Mr. William S. Wise, director of the Connecticut Water Policy Commission.

Mr. Wise, will you step up and take the witness chair, please?

STATEMENT OF WILLIAM S. WISE, DIRECTOR, CONNECTICUT WATER POLICY COMMISSION, ON BEHALF OF HON. ABRAHAM RIBICOFF, GOVERNOR OF THE STATE OF CONNECTICUT

Mr. WISE. Mr. Chairman and members of the committee, the Governor of Connecticut, Hon. Abraham A. Ribicoff, sincerely regrets that he is unable to appear here today, not only to discuss this bill, which is of deep concern to our State, but also to meet his many friends in Congress.

He had made arrangements to attend the first hearing April 5, which was called on this bill, but which was postponed.

He is extremely sorry that due to other commitments in the legislature he is unable to be here today.

Governor Ribicoff has asked me to record his strong support for Senate bill 414, introduced by Senator Prescott Bush of our State, and to tell you why this is of importance to Connecticut, and some of the things we are doing on our own behalf.

Problems of beach erosion and harbor improvement are handled in our State under the direction of the State water commission, of which I am director.

Since 1938, seven hurricanes have taken many lives and have caused tremendous property damage throughout New England. The three hurricanes in 1954 caused property damage in Connecticut alone of more than $33 million.

These catastrophes and their frequent occurence have created great concern among our people, and an urgent need for corrective measures. The beach erosion control meeting called by Governor Ribicoff on April 2 in Clinton to discuss some of these vital problems yielded abundant evidence of the critical conditions along our shore and brought forth many concerted pleas for help.

The Governor wanted me to assure you gentleman that we in Connecticut are moving forward on a bipartisan basis in meeting the beach-erosion problem. However, there are larger and more serious problems facing us because of recent hurricanes—and uncertainty over future hurricanes—which require Federal study and assistance and which, in our opinion, require passage of Senate bill 414.

Mr. Chairman, this bill calls for certain studies to be undertaken by the United States Army Corps of Engineers. As you will hear in my testimony today, the Army engineers have been of invaluable help to us in Connecticut, and they are still working on beach-erosion reports of the utmost urgency.

We in Connecticut are confident, gentlemen, that if this bill is adopted, calling for additional work by the Army engineers, that in the process of undertaking these new and enlarged studies, their competent staff people will not be taken off the beach-erosion reports which now are so near to completion and which are so necessary for planning our beach-rebuilding efforts in Connecticut.

The people of Connecticut have always endeavored to solve their own problems within the limit of their resources. The first comprehensive beach-erosion control survey in the country to cover the shoreline of an entire State was initiated by Connecticut.

After the severe hurricanes of 1938 and 1944, one-half of the total cost of $150,000 for the survey was appropriated by the State to carry

on the cooperative study through the United States Army Corps of Engineers.

In conducting this survey, the shoreline of Connecticut was divided into 11 areas. Reports have been completed by the Army engineers on seven of these areas. It is our hope that the reports on the other four areas may be completed without any delay, as this information is vitally needed for our beach-erosion work in Connecticut, and should contribute much useful information to the larger study of the Northeastern coast, which is proposed in Senator Bush's bill.

As a result of recommendations made by the Army engineers, in the reports which they have completed, the State of Connecticut has already appropriated substantial funds for corrective works on beaches in a number of our towns.

However, it is difficult to cope with the immensity of the problem and the engineering studies themselves are not always up-to-date because of the intensity and frequency of recent hurricanes.

The vast scope of the problems created by the recent hurricanes call for the type of studies and investigations possible only by a trained staff experienced in problems concerned with shores, tides, and storms, and with the structures necessary for their control.

However, the Army engineers and the Beach Erosion Board have within their agencies personnel with the necessary training and experience in all parts of the country.

Therefore, they would appear to be well equipped to undertake such an investigation. Connecticut has, in the past, had the most friendly, cooperative, and satisfactory dealings with the Army engineers in work of this nature; and their recommendations have been of great benefit to the State.

The 253 miles of Connecticut shoreline, with excellent harbors, constitute one of the State's greatest assets. Our shore front serves large numbers of persons engaged in industry and commerce, as well as providing recreational facilities and homes for persons who enjoy the ocean.

Unfortunately, our beautiful shore changes constantly, varying from place to place and time to time. In the past it used to erode at an average rate of about 1 foot per year. Hurricanes have hastened the rate of erosion.

Obviously, unless corrective measures are applied, our valuable beaches will not long continue to serve the growing needs of our people and our State.

The great problem confronting us is taking immediate and affirmative protective measures to preserve and develop this beautiful and valuable portion of our State.

An adequate solution is going to be complex because public and private interests are involved, and it is going to be costly because of the character and magnitude of the work.

There are many persons and agencies involved in this undertaking—private owners, beach associations, town, State, and Federal governments—and it is most important that all of the efforts should be coordinated to avoid duplication and confusion, and to promote the most effective and economical protective works.

Some idea of the importance of our shore front may be obtained from the estimated damage, as previously stated, of nearly $33 million

caused in the State of Connecticut in 1 year, largely from wind, waves, and tidal flooding, during Hurricanes Carol and Edna in 1954.

A large portion of this damage was to our beaches, and to property along our beaches.

Connecticut has 253 miles of shoreline in 24 towns and cities which border Long Island Sound. Approximately 770,000 persons reside in these towns and cities year around, and thousands of persons from other parts of Connecticut, from New York, Massachusetts, Rhode Island, and other States enjoy the Connecticut waterfront in the summer.

Six years ago the yearly gross seasonal real estate and income to local merchants and professional men in the beach towns was estimated at about $30 million. Certainly, the annual dollar value of our beaches is much higher today.

In fact, last year private sources indicated the figure was closer to $50 million.

Connecticut has already lost many miles of beautiful sandy beaches, which have been turned into unattractive muddy or rocky areas. The reclaiming of these areas and the rebuilding of other beaches will bring many benefits to our people and our communities.

A study of the reports of the Army engineers shows the actual dollar benefits accruing as a result of expenditures to improve beaches. Among the benefits are: the estimated increase in real value of shorefront property; the estimated increase in recreational benefits; the higher tax returns on the increased value of privately owned property; the actual value of the area of land which would be eroded and flooded yearly if the improvements were not made; lower maintenance costs for seawalls and other shore structures, which will receive better protection.

The most rapid development of the Connecticut shore occurred between 30 and 50 years ago when it became accessible by trolley and automobile. Structures were generally built about 50 feet back from high water. The present conditions arise chiefly from the fact that normal erosion has been greatly aggravated by severe hurricanes, and the shoreline has been eroded back to these structures.

Since September 1938, we have had 7 severe hurricanes and storms with tremendous damage in tidal flooding and beach erosion and other things.

At the recent beach erosion conference called by Governor Ribicoff in Clinton, Conn., town officials, property owners, and representatives of beach associations told of the tremendous damage to their homes and property. In one town alone, the town of Milford, erosion of the shoreline has become so serious that hardly a year goes by without the necessity of evacuating 12,000 residents, one-third of the town's population, each time there are abnormally high tides.

As just one example of the testimony at this meeting may I refer to a gentleman from Westport, Conn., who stated that since 1933, 38 feet of his shoreline had disappeared.

Normal beach erosion during this 22-year period would have been approximately 22 feet, so that it is fair to state that an additional 16 feet had been eroded due chiefly to hurricanes.

In fact, the severest damage has been during the last few years, and at a greatly increased rate.

We have in our files of the State water commission records showing beach erosion at Lyme, Conn., running in excess of 100 feet due to recent hurricanes.

If the committee would care to see it, I have a map with me detailing this situation.

Mr. Chairman and members of the committee, Governor Ribicoff desires to urge favorable consideration by this committee of Senate bill 414 authorizing the Army engineers to study the devastations of hurricanes along the coast of New England, New York, and New Jersey; so that a program of protective works and corrective measures may be instituted.

This is a matter of preserving life and property. It is of the utmost importance. One of Connecticut's most valuable actual assets is its beautiful shore front, and the State is most anxious to do its part in preserving and restoring this great asset to its maximum use and beauty.

Senator BUSH. Commissioner, would you kindly come down here and sit down, and we will have a little informal questioning here after your formal presentation.

Mr. WISE. Yes, sir.

Senator BUSH. Can you expand for the committee on how navigation projects can be tied in to this beach restoration program, as, for instance, the Housatonic River dredging and the New Haven Harbor dredging of a few years ago.

Would you tell us about that?

Mr. WISE. A few years ago, when the New Haven Harbor was dredged, there was a tremendous need for building up a sandy beach in New Haven.

There was ample beautiful beach sand available in the harbor, and instead of dredging that material and hauling it to deep waters and dumping it, arrangements were made to pump it onto the beach, and those beaches today have served to protect tremendous property values in West Haven just as a result of building up that beach.

The same procedure was followed, or is being followed in the Housatonic River dredging, where again large quantities of beautiful sand is available; so arrangements are being made in the contract for dredging to pump several hundreds of thousands of yards onto the Milford beaches, which are badly in need of sand replacement and also on Stratford Beaches, and in that way, the two benefits of river and harbor dredging and the great benefits from beach protection can be coordinated.

If the works are properly coordinated, they can be worked out to great benefit and economy because it was very much less costly to pump this sand on to the beaches than it is to load it in barges and haul it out 12 miles to sea and dump it; so economies result at the same time as great benefits.

Senator BUSH. Do you feel people all along our shoreline and inland some distance are solidly behind this proposition, you know of no opposition in our State to this bill?

Mr. WISE. I know of none, Senator, and certainly the people away at Hartford, and other places away from the shore, are deeply interested in this bill.

Senator BUSH. In other words there is no controversy about it of any kind, but so far as you can detect and from my observation also, the sentiment is unanimous in our area in favor of this proposition?

Mr. WISE. It certainly is.

Senator BUSH. Commissioner, we are very grateful to you for coming down here, and I wish you would express the committee's appreciation to Governor Ribicoff for making the statement on his behalf before the committee.

Senator Thurmond, do you have any questions?

Senator THURMOND. I was just wondering why this was limited to New England. What about South Carolina? We have some beautiful beaches that have been damaged in the same way.

Is there any objection to including them in this bill?

Senator BUSH. I introduced this bill, and at that time there seemed to be no interest on the part of any of the other States; and it was thought that the study would take the area in the path of the hurricanes where these tremendous damages had been done recently.

I was not aware, and nobody brought up the question of any of the Southern States being badly affected by hurricanes.

Senator THURMOND. Probably our State was the worst damaged. We had terrific damage: homes washed away and destroyed; the beaches terribly damaged.

I was just thinking if this study is going to be made, I would like for my State to be included on account of our recent terrific damage.

Senator BUSH. I am sure the committee would be glad to consider any amendment which the Senator cares to make. Certainly I would be delighted as the sponsor of the bill to have the utmost consideration given to it.

Senator THURMOND. There would be no objection as far as you can see to putting in another State?

Mr. WISE. Personally I do not see any as long as we get our study.

Senator BUSH. Would the Senator permit me to ask General Itschner if he would care to comment on the Senator's proposal?

Senator THURMOND. Certainly, I would be glad to have you do so.

General ITSCHNER. Mr. Chairman, I realize that the same hurricanes which occurred last fall and struck the New England coast also did severe damage on the coast of North Carolina and South Carolina, and the problems are very much the same in the two areas.

Looking at the picture objectively, there is just as much reason to make a study along that coast, I believe, as there is along the New England coast.

It will cost some additional sum of money, which we are not prepared to state at this time, above the amount we have estimated, of course, for the New England survey.

The same results that we find from the New England survey would be probably applicable in general to the solution of the problems along the South Carolina and North Carolina coast.

Senator BUSH. Thank you very much, General.

Senator THURMOND. Thank you, General.

Senator BUSH. Are there any other questions of Mr. Wise?

Senator SYMINGTON. Mr. Chairman, I would like to associate myself with Senator Thurmond's suggestion with respect to his own State.

In my opinion if there is going to be a survey here on this question, it is only logical for him to want the survey in his own State where the damage was comparable. I happened to be on the island of Nantucket during the time of both the hurricanes, Carol and Edna, and especially with respect to Carol, the first, because I believe there the damage was caused chiefly by the lack of proper information as to with what force it would strike, and when it would strike, and I don't see any provision in this bill or the one offered by Senators Green and Pastore in their bill with respect to getting better information having to do with weather.

Senator BUSH. I would say, Senator, that is certainly in my mind, and I think the language on page 2 is broad enough to cover it where it says, the survey is—

for the purpose of determining possible means of preventing damages to property and loss of human lives due to hurricane winds and tides, and the economics thereof, to be made under the direction of the Chief of Engineers.

"Possible means" would certainly include warning of a better nature than we have had, and I certainly agree with the Senator that much of the damage not only in Nantucket but in our area as well could have been avoided if we had had a better idea when that thing was going to hit and the force with which it might hit.

So, I would certainly hope that, and I would expect that, it would cover that, and in fact, I think that we should direct that it cover the point mentioned by the Senator from Missouri.

Senator SYMINGTON. May I ask the chairman another question?

Senator BUSH. Please do.

Senator SYMINGTON. Are the Army engineers in a position to make that type and character of survey, or ought the bill, in order to be certain that that type and character of survey, be made include some other department of the Government?

Senator BUSH. Would you care to comment on that question, General Itschner?

General ITSCHNER. We certainly would have to look to the Weather Bureau for that portion of the study and would work with them in resolving that problem.

Senator SYMINGTON. Mr. Chairman, in order that there be no misunderstanding about it and because I saw what tremendous damage was done as a result of lack of proper and adequate knowledge, I would respectfully suggest that you give consideration in your bill to delineating that a little bit more in detail so that it would be understood that it was going to be done.

My guess would be that people who saw only a bill providing for correction of erosion based on their actual knowledge of what was experienced on your shoreline there up around Massachusetts would see only a specific recommendation of correction of erosion unless it was clearly made known to them that there was something going to be done about the weather aspect.

For example, the figures given by the Commissioner include damages that could have been avoided if they had had adequate warning.

Senator BUSH. I thank the Senator for that suggestion. I think it is a very good one and when we come to write up this bill I will see if we cannot amend it to bring in language about warning and damages and put it right into the bill.

Senator THURMOND. Mr. Chairman, I would like to express my appreciation to the distinguished Senator from Missouri for associating himself along the request that I offered, and I was just thinking if the language could be made broad enough to cover the situation along the eastern seaboard—I don't know what the damage was in Georgia, in Florida, or in Virginia, but I do know there was terrific damage in North Carolina and South Carolina.

I think the warning service is very important and would be greatly appreciated by the citizens.

Senator BUSH. I thank the Senator from South Carolina and we will also try to amend the bill in committee so as to take into account his suggestions regarding that area. Are there any other questions of Mr. Wise?

If not, Commissioner, we are very grateful to you. Thank you for coming down.

Congressman Frank J. Becker, a Representative in Congress from the State of New York, is unable to be present in person and has sent a statement which will be inserted in the record if there is no objection.

(The above-mentioned document is as follows:)

STATEMENT OF HON. FRANK J. BECKER, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF NEW YORK

Mr. BECKER. Mr. Chairman, I appreciate the opportunity you have given me to appear before your committee in support of S. 414, introduced by the gentleman from Connecticut, Senator Bush. I believe that a preliminary examination and survey of the New England, New York, Long Island, and New Jersey coastal areas for the purpose of determining possible means of preventing damages to property and loss of human lives due to hurricane winds and tides, is of vital importance.

I am particularly concerned with the particular problem affecting Long Island, and therefore will deal with that specifically.

Long Island extends northeastward from the Narrows at the entrance to New York Harbor to Montauk Point about opposite (south of) the east boundary of Connecticut, a total length of about 120 miles. The entire 120-mile frontage is openly exposed to the North Atlantic Ocean. For about 10 miles westward from Montauk Point the ocean shore of Long Island is characterized by a series of cliffed headlands formed by erosion of the southern face of a glacial moraine. The shoreline from this section westward to about Southampton is a succession of wave-formed beaches that have closed former bays. The shore west of Southampton consists of a series of long, narrow barrier beaches or sand spits, broken by tidal inlets, and separated from the mainland of Long Island by an almost continuous body of tidal water.

The barrier beaches west of Southampton are composed of materials derived from erosion of the shore and headlands farther east, and possibly also from materials eroded from the ocean floor. The forces available to erode and transport this material are associated with the tides and ocean waves generated in the Atlantic Ocean. The alinement and exposure of the south shore of Long Island is such that the ocean waves approach it from an easterly direction, erode and transport the eroded material from east to west. Severe storms can create excessively high tides and waves, which permit wave action to reach and erode material from high on the shore, often eroding and breaking the dunes on the barrier beaches, and severely damaging improvements along the shore.

As the material is eroded from the shore and moved westward by wave action, its transport is significantly affected by the behavior of the several tidal inlets through the barrier beach. It has been estimated that the rate of westward movement of eroded material along the Long Island south shore amounts to between 150,000 and 450,000 cubic yards per year, depending upon the particular location. This westward moving drift may cause unstabilized inlets to shoal and close, or to migrate westward by deposition on the updrift or east side and erosion on the downdrift or west side.

It can be anticipated that any localized change in the natural processes at a particular location may have significant effect on other sectors of the shore.

The south shore of Long Island has been extensively developed with recreational park areas and residential communities. Nearly all of these developed areas have at one time or another suffered damages from the severe storms that buffet the area, necessitating construction of shore-protection measures at many locations. These protective measures have been in the form of beach fills, groins, bulkheads, and dune stabilization. In the interest of navigation it has also been necessary to adopt measures for stabilizing certain of the major tidal inlets.

Each item of new work accomplished either for shore protection or inlet stabilization, does in addition to serving its design purpose, play a part in changing the existing pattern of beach material supply and manner of transport. Protective measures which prevent erosion of the shore at the eastern end of the island may, if no beach material be added artificially, lessen the natural suply of beach material to sections immediately west thereof. Structures designed to widen or build up a beach by impounding the natural westward moving supply of beach material at a particular location will also decrease the rate of supply to adjacent shores on the west for a definite period of time. Inlet improvements may also substantially reduce the natural beach material supply to shore segments immediately to their west unless means are provided for bypassing the sand removed or impounded by the improvement past the improved inlet.

Shore protection and improvement measures for the south shore of Long Island should be developed on a comprehensive basis by considering and understanding as much as possible for the entire ocean shore of the island, the natural shore processes and the effects of their modification.

Cooperative studies were completed by the Corps of Engineers at Jacob Riis Park in 1935 and for the shore from Montauk Point to Jones Inlet in 1946. These studies form the basis for statements made above.

A cooperative study on Fire Island Inlet and adjacent shores westward to Jones Inlet is now being prosecuted by the Corps of Engineers in cooperation with the Long Island State Park Commission and is scheduled for completion in the fall of 1955. A study has been negotiated between the Corps of Engineers and the New York State Department of Public Works for the reach of shore from Montauk Point to Fire Island Inlet. The State of New York has indicated that its share of the costs of this study will be made available prior to May 1, 1955. Available funds are insufficient for the Federal share, thus completion must await future appropriations. There are no studies of the Long Island shore west of Jones Inlet in progress at this time (April 18, 1955).

Therefore, it is readily seen that various studies have been made of parts of Long Island, but no study completing the entire south shore, and I believe this is essential to any comprehensive plan to prevent the great amount of damage that has taken place due to hurricanes and tidal erosion. The great population of Long Island urges the necessity of some quick action, not only for the prevention of the possible loss of millions of dollars of property damage, but to the possible great loss of life that might be incurred, should work of this nature be longer delayed.

I therefore urge upon the committee for favorable consideration of S. 414.

Senator BUSH. Is Congressman Wainwright here? Is Congressman Derounian here? Is Senator Saltonstall here?

(There was no response from those present.)

Is Mr. Buckley of New Bedford, Mass., here?

Mr. BUCKLEY. Yes.

Senator BUSH. Mr. Buckley, would you come forward please. Will you kindly give your identification to the clerk.

You may proceed to make your statement in your own way.

STATEMENT OF JAMES B. BUCKLEY, VICE PRESIDENT OF REVERE COPPER & BRASS, INC., GENERAL MANAGER OF THE NEW BEDFORD DIVISION, NEW BEDFORD, MASS.

Mr. BUCKLEY. Mr. Chairman and members of the committee, I am James B. Buckley, vice president of Revere Copper & Brass, Inc., and general manager of the New Bedford division, New Bedford, Mass.

Mr. R. B. Young and I are appearing in behalf of a group of 35 industrial firms in the city of New Bedford who have, together, suffered over $9 million in losses in the 1954 series of hurricanes.

In the New Bedford area there was an estimated $50 million worth of direct hurricane damage, and the figure for industrial damage was the largest single part of the area's loss. Not only did the hurricane damage run into millions, but the loss to the city in payrolls amounted to a great deal more. These plants employ over 15,000, and represent a value of over $110 million in buildings and equipment.

Our group of 35 firms, both large and small, is a cross section of American indsutry, and the many service awards received by the various companies during World War II bear evidence of their contributions to the war effort.

I would like to discuss the hurricane problem from the point of view of the difficulties presented to our own company, which is repeated many times over by the other waterfront firms in the city.

Mr. Chairman, the New Bedford division of Revere Copper & Brass, Inc., is a consolidation of New England operations founded by Paul Revere in 1801.

Our plant site is on the banks of the Acushnet River, with the lowest building level about 5 feet above mean high tide. The present location was first established over 100 years ago, and until 1938 the prospects of hurricanes and subsequent floods were never a factor because it was over 125 years prior to 1938 that the last severe hurricane damage was recorded.

In September 1938 the New Bedford area was struck by a major hurricane which had its maximum winds at a peak high moon tide, and the resulting flood height was more than 12 feet above mean high tide.

I believe all of you gentlemen are familiar with the usual hurricane picture; namely, high winds, falling trees, crashing roofs, buildings, et cetera. To the average industrial plant situated along a river, as we are in New Bedford, the above depicts only a minor part of our hurricane troubles.

The major industrial problem, where hurricanes are concerned can be summed up in three words: Salt-water flood. This flood, which is created by a combination of low pressure and high winds, acts in a way that is difficult to describe to anyone who has not been there in person.

The tremendous force of surging water and wind is sufficient to propel huge boats, plus every conceivable sort of floating wreckage, houses, and so forth, through the water with the force of battering rams which knock down the brick and concrete walls of buildings as though the latter were made of clay.

The building damage, however, is still a minor item with most industrial plants. The salt water inundates conduits, motors, switch gears, and bearings, until, in a plant like our own, there is not 1 out of over 1,000 pieces of equipment that does not require a major overhaul.

Every bearing has to be taken apart, cleaned, and repacked; every electrical cable has to be pulled and rewired; all motors have to be removed and dried, and a large number have to be completely rewound. In-process and finished material is ruined.

Where once there stood a modern plant, an hour after the flood, there remains a mass of inoperative machinery, most of which is having vital parts corroded by salt action.

Gentlemen, it is a grim picture after a hurricane has passed on.

We in New Bedford, after the 1938 hurricane, looking at past records, decided that perhaps it was worth while taking another chance. We hadn't had a hurricane for the previous 125 years and 1938 was probably just a freak. But again in 1944 New Bedford was hit. This time, fortunately, the hurricane struck at low tide and damage, though severe, was not nearly as bad because the water was about 4 feet less than in 1938.

Once again, New Bedford industries decided that perhaps there was no trend, and we could take another chance.

1954, however, changed all this. On August 31, Hurricane Carol hit with very little warning. Winds up to 125 miles an hour struck just after high tide, and the resulting flood was almost 12 feet above mean high water.

Gentlemen, our own plant, which had installed the latest in machinery and equipment, was hit a staggering blow which cost us $1,455,000. That figure does not include the loss of profits, customers, and other intangible losses that occur when you are out of commission for a month or more. We were still reeling from the impact of Hurricane Carol when we were visited by Hurricane Edna which, fortunately, although accompanied by high winds, brought no flood.

Later on Hurricane Hazel gave us a brief scare, although it veered off inland. Our group of 35 waterfront plants spent over $300,000 in hurricane preparations for Edna and Hazel.

Mr. Chairman, and gentlemen of the committee, I would like to now make reference to a letter from Mr. E. M. Vernon, Chief, Synoptic Reports and Forecasts Division, United States Weather Bureau. In answering a general inquiry as to whether New Bedford might expect further hurricanes, Mr. Vernon wrote:

> The hurricanes of the past season, 1954, in your area tend to indicate a frequency considerably greater than that indicated by records of previous years.

The people of New Bedford can back up Mr. Vernon's statement.

And I think it is obvious that waterfront industry in New Bedford cannot stand the cost of another Carol.

New Bedford industry, though hard hit, is fighting back with whatever means it has within its grasp; for instance, all along the river there is evidence of bricking up of windows and doors; bracing walls; and various other efforts to combat future floods.

Our group of 35 firms is spending over $1 million of their own funds to help protect themselves against future floods.

Now, our own plant is carrying out an extensive flood-protection program, which even goes as far as putting bulwarks in the river to fend off large boats which might batter down our walls.

Some plants can be engineered better than others against flood, and some companies, naturally, can afford a flood protection program better than others, but, whatever the individual situation may be, we believe it is a logical function of the Federal Government to assist our communities in the minimizing of future hurricane losses.

We are, therefore, wholly in accord with Senator Bush's bill S. 414, which will initiate the process by allowing the Army engineers to study means of salt water flood prevention.

Senator BUSH. Mr. Buckley, I congratulate you on that statement. It is a very excellent statement. I had the good fortune—I always think it is a good fortune to pass down through New Bedford—but I passed between those hurricanes Carol and Edna; and I think you have painted very vividly the damage, although when I passed through, they had started to dig out, but I can assure the committee that Mr. Buckley has not exaggerated this situation one bit.

Mr. BUCKLEY. Thank you.

Senator BUSH. But I do think you painted the picture very vividly, and we are very grateful. Thank you for coming down here and supporting the bill.

Senator Cotton.

Senator COTTON. May I ask the witness a question, please?

Senator BUSH. Yes; please do.

Senator COTTON. You mentioned your plants spending $300,000 in hurricane preparation for Edna and Hazel, and you also mentioned that various plants spent a sum of money to protect themselves from future hurricanes.

In view of the fact that we are considering a study, a survey, of means to prevent damage, I wonder if you would tell us in a brief sentence or two what were the means you resorted to in seeking to protect yourself from that damage.

Mr. BUCKLEY. We have had a group of 35 companies in the city, and the bigger companies have lent their engineering department to this project so that we all might benefit.

In our particular plant, we have gone around the entire periphery of the plant and protected it up to a level to 18 inches above the 1938 flood, which came at a peak high-moon tide; and we believe we can make the flat-water tide, because a hurricane flood only stays in from an hour to 2 hours.

There is always the danger of something, a big boat for instance, ramming against our walls, in our case we are going out into the river and putting these pilings to help, by being fenders, keep the fishing boats off.

This $1 million is that type of program divided among the 35 companies. We are bricking up walls. We are fixing our doorways so that we can either put flood gates or something of that sort, we are fixing sewers, and the $300,000 that I referred to refers to sandbag and emergency preparation for those two storms.

When we heard the storms were coming, we could not just sit and do nothing. We moved over 500 motors in our plants to higher ground, and then we had to put them all back again.

Senator BUSH. Do any of the other Senators have any questions?

Senator SYMINGTON. Mr. Chairman, I was in New Bedford right after Hurricane Carol and Hurricane Edna, and again I think that Mr. Buckley who has made this excellent statement will agree that much of the damages of Carol was the result of inadequate warning. I am correct on that, am I not?

Mr. BUCKLEY. We figure that in our own plant we could have saved $300,000 to $500,000 of we had known there was a flood coming.

We were actually caught with material in furnaces that were frozen.

Senator BUSH. With your capacity for moving things alone, you would have saved a lot, would you not?

Mr. BUCKLEY. Yes; if we could have just gotten our material out.

Senator SYMINGTON. Correct me if I am wrong, you were told it was not going to hit there, were you not?

Mr. BUCKLEY. At 10 o'clock in the morning, I checked and I had a little anemometer, and it had 100 miles an hour and blew off the roof; and we were still told there wasn't going to be a hurricane until that afternoon; it wasn't a hurricane.

Senator SYMINGTON. As far as Nantucket was concerned, you being on a seaport, although the winds were greater than they were in Carol, it seems that the people were warned better, and that time it resulted in considerably less damage.

Mr. BUCKLEY. Yes; that is right. There is one thing you have to do. If you cannot stop the flood, there is going to be a lot of damage to a plant like ours in which we have very heavy equipment which just cannot be moved.

We have one piece of equipment that has over 1,000 yards of concrete in it. You cannot move that. It just has to stay there.

Senator BUSH. I would like to ask the committee if you think we should perhaps consider a separate bill in connection with this warning matter because that isn't a matter that should take so much time as this engineering study, which the engineers indicate may take 2½ years.

That involves the preparation of a lot of models and a great deal of engineering work that is going to take a lot of time, and it is expensive.

I would like to ask the Senator whether he thinks favorably of the thought of whether it was not his thought that perhaps we could take up a separate bill, which would cause our meteorological services to devise a better warning system, so that at least we face the coming season with some preparation in that department.

Senator SYMINGTON. I would suggest to the Chair that inasmuch as, as I say, I happened to be actively connected with both of these hurricanes, there was regret on losing the beaches, but there was great bitterness on the part of the people because of the lack of warning.

I am only trying to be constructive from the standpoint of his own locality, and I would also say if something is not done, it might affect one of the great industries of New England, the tourist trade, because there are certain places in the country where people are careful not to visit in what might be called the hurricane season, and inasmuch as New England had last year three major hurricanes—Carol, Edna, and Hazel—I would think, if I may respectfully suggest to the Chair, that any way that we presented it to the Congress certainly, to the Senator from Missouri, would be entirely satisfactory, provided it is a packaged problem.

I remember also—and I believe Mr. Buckley will remember also—that Senator Green of Rhode Island and some of the others expressed great resentment over the lack of information that came to the people of Rhode Island as a result of Hurricane Carol, and, therefore, if I might respectfully suggest to the Chair, you might discuss this aspect of the problem with Senator Green and Senator Pastore.

I imagine Senator Cotton would know a lot about it because New Hampshire was also affected.

Senator BUSH. I think the Senator's thoughts are very constructive in this matter, and I assure him that I personally will give them the most careful consideration. I think they are very helpful.

I again think that we should consider, and I will propose to the committee in due course, that we add another section to the bill which will deal only with the question of warning and separate that from the problem of engineering; at least make it a separate problem of immediate importance so that we can have it all in one bill, and let the engineers go ahead with their long-term study.

But let us get this warning thing done so that this summer will not pass without us having an adequate warning system if we can help it.

The Senator has emphasized the great importance of the whole bill and that would apply equally to the whole coast, as I am sure the Senator from South Carolina and any other Senator must know.

I thank you very much, Mr. Buckley for your fine presentation. Both its brevity and clarity were very impressive.

Mr. BUCKLEY. Thank you, sir.

Senator BUSH. Did Senator Saltonstall come in?

(There was no response.)

Congressman Derounian came in I see.

Mr. DEROUNIAN. Yes, sir.

Senator BUSH. We would be glad to hear from you, Congressman Derounian.

STATEMENT OF HON. STEVEN B. DEROUNIAN, REPRESENTATIVE IN THE UNITED STATES CONGRESS FROM THE SECOND DISTRICT OF THE STATE OF NEW YORK

Mr. DEROUNIAN. Mr. Chairman, I appreciate the courtesy extended for me to be here this morning.

I am Steven B. Derounian, Second Congressional District of New York, which comprises part of Long Island.

I would say, Senator Bush, that your bill is certainly basic and fundamental and sensible; and I think it is the right way to approach this whole problem of damage from hurricanes.

As you probably know, quite a bit of Long Island on the eastern end has been severely damaged from heavy hurricanes. In fact, in 1938, Westhampton and a lot of the Hamptons were completely submerged, so I look with great favor on this bill; and I want to heartily recommend its passage by your committee.

Senator BUSH. Thank you, sir, and the committee is very grateful to you for coming over to support this measure and give us your views on it.

Thank you very much, Mr. Derounian.

Senator CASE. Mr. Chairman.

Senator BUSH. Senator Case.

Senator CASE. Would it be appropriate to ask at this time why the bill is limited to New York, New England, Long Island, and New Jersey?

Senator BUSH. May I say to the Senator that question came up a few moments ago before the Senator came in. My only explanation of it is that at the time we prepared the bill, it was done in the light of the

damages affected by these particular hurricanes—Carol, Edna, and Hazel, all of which hit the area mentioned in the bill with extreme force—and the other affected areas in connection with this series of hurricanes did not suffer material damage.

And Senator Thurmond, just before you came in, did raise this question and suggested that the bill be broadened to include other States on the shoreline, notably North Carolina and South Carolina. I assured him that the committee would consider that and consider amending the bill to that end.

That is all I have to say in answer to your question, but I will be glad to hear what your viewpoint is.

Senator CASE. My only reason for asking the question is because I happened to visit Wilmington, N. C.—I was down there for a meeting of Town Hall—and it being Sunday afternoon, they took us around to show us different things around the city.

One of the principal things they wanted to show us was what the hurricane had done to the outlying portion of the resort section.

Senator BUSH. It still shows the effect of it?

Senator CASE. It still shows the effect of it, and we were shown where boats had been driven and houses that had collapsed.

If we are going to do this and get a meaningful report by the Corps of Engineers on the economics thereof, as the bill suggests, it ought to be something that would cover the other area because it would be inconceivable that Congress would eventually authorize a program for a portion of the hurricane-hit territory; but I cannot quite forget what I saw that Sunday afternoon about a month ago.

Senator BUSH. I thank the Senator for his observation. I think he is quite correct. As I told Senator Thurmond, we shall certainly proceed to amend the bill so as to take that into account; but I do say in explanation there was not any intent to be selfish about this on anybody's part; but the only people interested in it at the time we prepared the bill seemed to be the area mentioned in the bill.

But I certainly think that the Senator is right to feel that the investigation should be broadened to take in these other affected areas.

Are there any other observations on this point? If not, Congressman Wainwright is here. We would be glad to hear from you, sir. Proceed in your own way.

STATEMENT OF HON. STUYVESANT WAINWRIGHT, REPRESENTATIVE IN CONGRESS FROM THE FIRST DISTRICT OF THE STATE OF NEW YORK

Mr. WAINWRIGHT. Thank you. It is a pleasure to testify before this committee, and I would like to state that after reading this bill I introduced a companion bill in the House; and I am told by the chairman of the Public Works Committee that hearings on my own, on our, bill will be heard in the not-too-distant future.

It is a question of, as I mentioned to the Senator earlier today, not which area was hit the hardest, whether it was Long Island, Connecticut, Rhode Island, or Massachusetts, but we all suffered incredibly.

After our discussion this morning, I called General Tally, the North Atlantic Division Engineer, who is certainly one of the most compe-

tent engineers in this field in the world today, and his office recently completed a 49-volume survey, which they presented to the Chief of Engineers on the 31st of March of this year, which is known as the NENYIAC report.

The NENYIAC report is this comprehensive engineers' study of the New England region, which is encompassed here, and it only scratched the surface on the hurricane question.

Out of forty-some-odd volumes, they had only a few pages on what should be done, or what could be done in regard to hurricane damage.

They did point out this though, which I believe this committee would be interested in, and that is that the damage that was done by Hurricane Carol first of all was equal to the 1938 hurricane in force. Many people have said that in force it was not equal. That was one of the questions. Not including the interior damage to Connecticut and Massachusetts and Rhode Island on public utilities and other such things, the damage was over $305,818,900 which was done along the shore, so you can use your own judgment and probably develop that for the damage to public utilities and so on in the interior.

The conclusion in regard to hurricanes of the NENYIAC report was that there was inadequate warning system, that more research ought to be done; that there ought to be research into the importance of radar, but particularly that there ought to be special studies—they recommend a special study—to determine what corrective measures should be taken such as the possibility of putting public utilities underground, the special installation of telephone stations, emergency stations, and so on.

It is my understanding after reading that and after talking with General Tally today that your bill would accomplish that, would provide just such a recommendation as the NENYIAC report has come up with. These people have taken 2 years making this very careful study of the New England region and have, after spending this amount of time and applying the best engineering principles that we have in the United States, as one of their principal recommendations that a study of this kind be made.

I hope that your committee and our committee on our side will pay some attention to those recommendations and the extensive study that these engineers have undertaken.

Immediately after the Hurricane Carol last year, I had a series of conferences with the Chief of the Weather Bureau and their meteorologist.

Informally, they came to the conclusion that the New England region was in the hurricane path due to a cold airmass in the Newfoundland region, which had started to develop during the past 8 or 10 years during the hurricane period during August and early September; and after that this cold airmass dissolved and moved out.

However, at that time they refused to come up with any conclusive proof because they said their research was inadequate and they had inadequate funds to come to a definite conclusion.

Subsequent to that time, they have come to a conclusion that this area covered in this bill is in the hurricane path.

If we are to accept that, I am of the opinion that there is no work, no research, and no planning, or advance thinking being given to the protection of the area set forth in your bill, which I understand

is so comprehensive that it could not be done in a period of less than 2 or 2½ years; is that correct?

Senator BUSH. That is what the Engineers told us.

Mr. WAINWRIGHT. And would cost in the neighborhood of $2 million to $2½ million. I told that to our people on the House side, and they are not a bit frightened of it.

Senator BUSH. Congressman, would you mind my asking you a question? In your conversations with the Weather Bureau people, did you discuss with them the possibilities of improving right away the warning system for our area?

Mr. WAINRIGHT. Yes, sir; I did.

Senator BUSH. Did they give any hope that that can be done?

Mr. WAINWRIGHT. Yes, they have instituted a new section in the Weather Bureau which has not been given much publicity, which is a hurricane—I do not know the correct title, but in effect it is a hurricane—warning section, which will be beneficial not only to us but to the areas that Senator Case was referring to; the whole Atlantic coast will get benefit from this new division.

However, they still feel they have inadequate funds to do the job properly. On Long Island itself, we are going ahead on an erosion program, but we are limiting it to the south shore.

Senator BUSH. Congressman, would you mind another interruption? May I ask the chairman of the committee, Senator Kerr, if he thinks it is appropriate for me to ask unanimous consent of the committee at this point to have our staff talk with the Weather Bureau people so as to advise this committee whether we should introduce an amendment to this bill or a separate bill calling on the Weather Bureau to improve this warning network?

Senator KERR. My suggestion on that, Senator, would be to ask them to come here and testify. We are going to be having hearings in the morning on a companion bill to this.

Senator BUSH. I see, certainly, on the whole business. It is the companion bill that the Senators from Rhode Island introduced.

Senator KERR. Do the witnesses on this bill or the other bill include anyone from the Weather Bureau?

Senator BUSH. No, sir; we do not.

Senator KERR. Why would it not be well to proceed first by asking both a representative of their legal division and technical division to come here in the morning prepared to testify along the lines that you suggested questionsfi and we could explore it further?

Senator BUSH. Without objection it is so ordered.

Mr. WAINWRIGHT. One last point that I would like to call to the attention of the committee is that we on Long Island feel that this is such a serious situation, because you, in general, are familiar with Long Island, but for those who are not, we are protected on the south side by a barrier beach, which reaches anywhere from 10 to 25 feet, of plain, ordinary sand dunes held together by sea grass.

The amount of bulkheads and erosion substance that exist on the south shore of Long Island is negligible. A few wealthy property owners have those put in front of their properties, but the great majority of the property has no protection whatsoever.

Long Island juts out in an east-west direction, and consequently it receives along the south side the full brunt of these.

In the inland region of Long Island, there are 100,000 acres of rich farmland that could very conceivably be inundated during these floods.

During my brief lifetime and having grown up along these sand dunes, I have seen them settled away from anywhere from 75 feet to 100 yards and cut down in height so that in many places now there is just a breakthrough along this beach barrier that protects Long Island.

It is not at all inconceivable that this area known as Fire Island—and I have a gentleman with me from Fire Island—if that sand barrier goes, that the water will jump across to the Great South Bay and from then on God knows what will happen to Long Island.

Senator BUSH. We may get it over on the Connecticut shore and that will improve our beach problem.

Mr. WAINWRIGHT. We do have very fine sand, Senator. Thank you. I would be perfectly willing to answer any questions.

Senator BUSH. The committee is very grateful to you, sir, for coming over here this morning and appreciates very much your clear testimony.

Are there any questions, Senator?

Mr. WAINWRIGHT. Sir, I have Mr. Dore here, who would like to say something.

Senator BUSH. The Senator has asked if he might speak at this time, and we will call Mr. Dore later.

STATEMENT OF HON. LEVERETT SALTONSTALL, A UNITED STATES SENATOR FROM THE STATE OF MASSACHUSETTS

Senator SALTONSTALL. Gentlemen of the committee, may I speak briefly on this subject.

Mr. Chairman, I know that you have received testimony from people here in reference to the south of New Bedford, and I just want to add my word that I hope that this committee will give very careful consideration to the problem of damage to our seaboard in New England and adjoining areas caused by recent hurricanes. The frequency of these hurricanes is apparently a new development.

It is my recollecttion from history that there was a very severe hurricane and rising tides in the Rhode Island and Cape Cod area back in the first quarter of the 19th century, about 1819.

You will know, Mr. Chairman, in the city of Providence, down below the station right in the main street, on the biggest hotel in Providence, there is a marker on the second floor where the water came up in 1819 and again where it came up in 1938.

The next substantial damage that came from such a concurrent wind and tides condition occurred in September 1938. I think I am correct on my history on that.

This equaled, and in some ways exceeded, the records of hurricanes approximately a century earlier. In 1944 there was another hurricane which caused very considerable damage. I was in the State House in Boston as Governor then and throughout the day watched its approach up the coast. When it was clear that we might be hit, I went on the air and several times warned our Cape Cod residents of its threat to life and property.

Based on the experience of the previous century, it would seem that we would not experience another of these hurricanes for a very con-

siderable period of time, but such is not the case. There was another severe hurricane in 1948, and in 1954, we had hurricanes Carol and Edna which caused great damage over a wide area.

I might say, Mr. Chairman, with a smile to your members who are sitting at this table that I thought based on history that there was not going to be another hurricane in my lifetime, so I never took out any insurance because I said I would not be alive when the next hurricane hit.

Senator KERR. Will the Senator yield?

Senator SALTONSTALL. If it is a question along the lines, Mr. Chairman, that there was an opportunity, when Senator Kerr was Governor Kerr, for me to provide an automobile for him on a visit to Massachusetts.

As he was there on a strictly partisan connection, therefore, he declined my automobile. It was in that spirit that I say I will yield for a question.

Senator KERR. I must say that I appreciate the genial friendly reference to the occasion you have mentioned nearly as much as I appreciated the occasion. The question I wanted to ask was this: Since you have made a personal reference, have you now procured insurance against the future?

Senator SALTONSTALL. I have not. I am going to rely on my life term.

Senator KERR. I must say that my reaction to this bill might be affected by the degree to which you seriously regard it, and that one evidence of that could be whether or not you think it is serious enough for you to take out insurance to protect your property.

Senator SALTONSTALL. I say this in all seriousness: I do live in Massachusetts down in the Cape Cod area.

The first hurricane in 1936 came to my area and demolished much of my property—this in trees and forests. In fact, there were 300,000 feet of pine trimmed down in a very small area—board feet, that is—in the hurricane where there was a very substantial loss of trees in that area.

Senator KERR. I might say to the Senator that I visited the Worcester, Mass., area subsequent to the tornado that hit it.

Senator SALTONSTALL. That was one tornado; of course, that was not Edna or Carol.

Senator KERR. But it was one the devastation of which was complete in the area that was hit.

Senator SALTONSTALL. The question, of course, of insurance and hurricane insurance, I say very seriously, because you asked it as a serious question, has gone up very much in expense. The question for anybody to consider—they have got to consider—is where do they live and what damage to the property can be done and balance that against the tax situation—against the insurance premium situation—and what they consider it worth, and say, frankly, "I hope that these hurricanes will not occur."

It has been stated that the increasing frequency of these hurricanes may be due to a change in air current conditions combined with water current conditions. Certainly we want to know more about them and to be better prepared if they are to be of greater frequency.

Congressman Wainwright mentioned just Long Island. We have the problem of erosion in the whole Cape Cod area and, as the Senator

from Oklahoma knows, Buzzards Bay is very shallow, and you take it at high tide and take a violent wind blowing as it was in 1938, and it swept some 20 to 30 feet—I will not be accurate as to which one—above the ordinary tide level at the top of the bay.

That meant there was a great destruction of property, and to yachts, and shipping. There was a great destruction of property, and there was a great loss of life in New Bedford.

Then came the hurricane in 1944 when we were prepared. We got the people out of these areas, but there was still damage to the property.

However, this year when Hurricane Carol hit, luckily, the tide was down and that made a great deal of difference because that made a great deal of difference in the water level.

I have read articles, which would seem to indicate that the air currents have changed to a certain degree, as undoubtedly the acting chairman has read, which say these air currents force these storms, which normally go out at, say, around Cape Hatteras, now come up the coast more.

As I say, we followed the storm up to New London, and based on 1938, we thought it would go up toward Worcester, so we sent a lot of our apparatus up to Worcester and the State Guard, and our emergency fire apparatus, but it swept down over the Cape Cod area.

Then in 1954 we had these two storms. The first one caused a great deal of damage along the seacoast. Edna came in again, and while it went along the seacoast, it did come up into Massachusetts and caused considerable damage to trees, to houses, and, of course, to agriculture at that time.

That is the problem. If these things are not going to be a century apart, between 1819 and 1938, for instance, we have got to consider very seriously if they are going to be recurrent what we can do and what is the relation of the Federal Government.

We cannot ask the Federal Government to put a breakwater from Mississippi clear up to Maine. That would be impossible.

What is the relation of the Federal Government? Is it just the Weather Bureau? Is it some form of supplementing insurance so that we can get cheaper insurance, like the New Bedford industries. If so, what form should it take?

When you go into destruction of that character, then there is no limit to what you can ask for insurance and ask the Federal Government to assist; so you have, as I say, the 3 or 4 questions.

One, are these storms likely to be recurrent due to our weather conditions?

Two, what is the relation and the duties of the Federal Government in connection with it?

Three, what, if anything, can there be done on the insurance question. Those are just three that do occur to me offhand.

As I say, I came in contact with this problem in 1938. It came right at the time when we had a very active political campaign, and I saw a lot of these areas as a candidate at that time.

In 1944 I was the Governor of the State, and I saw it again. Last autumn I saw it as a citizen and also as a candidate for reelection to the United States Senate, so I saw it all those times, the actual damage, and I talked with the people about what the problems were and what could be done.

That is why I was very interested, Mr. Chairman, to come up here and testify this morning; and I say with a smile to my good friend from Oklahoma I do not want him to think I am taking this thing lightly because I do not.

Senator BUSH. The Senator from Oklahoma.

Senator KERR. I asked Senator Case to wait a minute, and he very graciously did. Yesterday the Chief of Engineers told us a good deal about the program of the engineers, and some of the problems of the engineers.

I would like for Senator Bush and Senator Saltonstall to have a calendar of this committee, which discloses some 28 pages representing committee resolutions which this committee issued during this and previous Congresses directing surveys by the Army engineers with reference to projects; and the testimony of the Chief and General Itschner disclosed that there are some 800 or more surveys that have been directed here by this committee or by the committee of the House or by general legislation that have not been made; that the appropriation for this kind of work a year ago was $2½ million, was it not, General Itschner?

General ITSCHNER. $2,337,000; yes, sir.

Senator KERR. And that the request for the appropriation this year was $1,750,000. They have told us that on the basis of the appropriations, this limitation, it would take them 12 years to complete the surveys that have been ordered thus far without giving any consideration to those which we know will be directed in the future.

The Chief advised us that they were having serious trouble in keeping their personnel due to inadequate appropriations and to conditions which are not conducive to persuading men of great professional ability, such as both the officer and the civilian personnel of the corps have and have to have, to stay in that service.

I must say that I am impressed by the need for this legislation. I would think that it would of necessity have to comprehend not only the Atlantic coast but also the coast of the Gulf of Mexico, where they have seen more hurricanes than you have in New England.

I think we will need to go into that with the Weather Bureau, if they have representatives here in the morning; and I think there just might be other areas that have sufficient damage to warrant inclusion.

I think, and I would like to have the reaction of the Senator from Massachusetts, that is the problem which will be created if we assign a task like this to the engineers when they are in the poverty-stricken condition they are with reference to both finance and efficient personnel to carry out the assignments which have already been given them and which will be added to in the normal course of events.

Senator SALTONSTALL. Mr. Chairman, might I comment on that? My answer to your question, Senator Kerr, is I do not think that fundamentally in the first instance is a problem for the engineers.

As I stated, I don't think that we who are Members of the United States Congress can expect to protect the Gulf of Mexico. I agree that if you are going to make an engineering survey, you have undoubtedly got to improve it.

I think this is primarily in the first instance a study of air currents, and the problem of the relationship of the Federal Government to your whole problem of, we will say, hurricanes.

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However, the acting chairman, who has introduced the bill, may not agree with me; but I would think the committee should consider appointing a committee of experts on weather, perhaps an insurance man, and a man from the Bureau of the Budget, or one of the Government departments as determine the relation of Federal activities to the State and local governments.

I would be disappointed if this committee turned this in and made this a resolve for physical protection of the seacoast, because I do not think that is practical.

I would look upon it from that point of view that I have tried to describe.

Senator BUSH. Mr. Chairman, I would like to say that the Senator is right, that I do not agree with him offhand about that, because I do think that the bill calls on the engineers to suggest protective measures on the seacoast, not a dike running the length of the whole coast, but a good many breakwaters, and seawalls, which will do a great deal to minimize the damage from hurricanes.

I do not know just what the engineers are going to recommend; but from my conversations with them, it is going to take them a long time to determine what is needed.

But they have not indicated in any way that it is not possible to establish protective measures along the shore, which will prevent damages and decrease damages.

Senator SALTONSTALL. Mr. Chairman, maybe I was a little facetious at the start. I did not mean to be.

Senator BUSH. It was not a question of facetiousness, but I just do not agree with the Senator, if he does not think that protective measures should be considered.

Senator SALTONETALL. I think they can be considered, but I think primarily you have got to consider the frequency, whether there is any definite knowledge that these things are going to be more frequent.

As I said, I did not mean to be facetious. I referred to the high-water mark in the Ritz Carlton Hotel in Providence, which happened in 1819. Then it happened in 1938 and I saw a good deal of damage, and the river went up, I think, above the 1819 level. That was, of course, 120 years apart. Were we going to have that thing again? In 1944 we had another one. In 1949 we had another one, and in 1954 two, and the possibility of a third. That is completely different from waiting for 120 years.

It seems to me it is fundamental to determine whether we are in a position now because of these water currents and air currents combined, ice conditions, to expect more of them. If you get that, then where does the Federal Government fit?

Senator BUSH. May I just answer that one point and then I will recognize the chairman. The Weather Bureau is going to appear in the morning, and if the Senator could be here, I think it would be interesting because, of course, you are interested in this matter, and hear what they have to say about this matter.

Senator SALTONSTALL. I thank the Senator. I came up here as a witness, but I appreciate the invitation.

Senator BUSH. Yes; but because of your very special interest, I am sure that the committee would be glad to have you here when the

Weather Bureau testifies, and I am sure Senator Kerr would be glad to have you ask some questions in view of this argument this morning.

Senator SALTONSTALL. Thank you, sir. I did not add any testimony concerning New Bedford because I understood that had already been covered.

Senator BUSH. Thank you very much. Senator Case.

Senator CASE. Senator Saltonstall, I noted that in your testimony on two different occasions you referred to something that suggested that improved weather warning service might help.

Whether you did it inadvertently or not, I do not know; but at one point I remember your saying that you yourself were on the air several times and warned the people.

Apparently at that time you thought it would be helpful in the saving of life and injury and possibly even property damage if people were warned; is that correct?

Senator SALTONSTALL. That is correct, sir; and I sat in the State house for 16 hours one day watching this hurricane from the lower end of Florida come clear up the coast and having in mind the experience of 1938, and I think we did save some lives then.

Senator CASE. At one point in your testimony you used the phrase, "We had the people moved out."

Senator SALTONSTALL. Yes, sir.

Senator CASE. You thought that that saved some lives, too?

Senator SALTONSTALL. I did. We had our State guard go from house to house in certain areas.

Senator CASE. The reason I wanted to draw attention to both of those expressions which, I think, were mostly incidental to your general statement, suggests that a great deal of the loss of life, the injury to people, and possibly even property damage might be averted by improvement of warnings, by wider dissemination of information on the advancement of hurricanes.

Senator SALTONSTALL. I think that is very true. In Carol I was down on the Maine coast, and we watched that hurricane—I was on a holiday—for 12 hours.

Senator CASE. So that would suggest that one of the things on which we might get the greatest dividends on the amount of money invested would be improvement of warning systems; is that covered?

Senator SALTONSTALL. I agree with you, sir; and I say the meteorological problem and the warning problem are two very essential questions that the Federal Government can investigate.

Of course, they can investigate the proper seawalls and so on, and I do not want to say they cannot.

I was trying to point out to the chairman of the committee, Senator Kerr, that I thought that it was not so much an actual problem of the engineers because I do not want to go against the chairman of the committee, but it is a question of the weather conditions and the relation of the Federal Government to the problem and what it can do to help practically and sensibly in the near future.

Senator CASE. The second thing, Mr. Chairman, that I would like to suggest is whether the committee in its study of this resolution, if it should adopt the suggestion of a commission to investigate this, should consider getting testimony from some meteorologists and particularly those who have been interested in the possible modification of clouds and hurricanes by cloud seedings.

When the Committee on the Interior 2 years ago was considering legislation which resulted in the final establishment of the Advisory Committee on Weather Control, Dr. Vincent Schafer, of General Electric, gave some testimony, which suggested he was of the opinion that it was not impossible to modify the effect of hurricanes.

In fact, he was in an atmospheric condition that was incipient for hurricanes, and he expressed the opinion that it would have been possible to have modified the effect of that hurricane by cloud seedings.

That I recognize is going into a research angle of the thing, and it is a subject on which opinion is divided. Vandevaar Bush and others have said that cloud modification is possible. I think that if we are going into an exhaustive study of this thing, it should be brought to the attention of the Chief of Engineers or to the commission if one is appointed, or to the committee itself.

Senator KERR. About the observation of my good friend from Massachusetts, as I understand the purpose of this bill, it is twofold. No. 1 is the study of the problem; and No. 2 is to seek, if practical, some solution with the view still of helping solve the problem.

Senator SALTONSTALL. That is correct.

Senator KERR. I can understand how the Weather Bureau could be enlarged there, and the meteorologist engaged and devoted to more adequate forecasting and warning, but it would seem to me if the program were limited to that, it would be more of an academic program.

I would think it would be a small comfort to the thousands of millions of people along the coast who have property to be assured that they were going to have accurate information of the destruction of their property, but that they wanted them to let that suffice, if they contemplated the probability of its destruction and be comforted by the fact that they had been warned.

Senator SALTONSTALL. As I see it, Mr. Chairman, following up, and thinking perhaps a little out loud, it seems to me that there are two bites to the cherry.

The first bite is to study the meterological condition, and the relation of the Federal Government, and what it can do and do promptly; and, secondly, if that group shows that these things are to be recurrent problems that we must handle them, what can the Federal Government do to protect the shores.

Senator KERR. When you get down to that, you get right back to the engineers.

Senator SALTONSTALL. That is correct, but it seemed to me in the first instance, that while the engineers, of course, can be of help and, of course, they have done a lot all along these coasts.

I would say do the two of them together, if you can; but you raised the question of whether the engineers were overburdened, and I agree that we have put a lot of problems on them, and so I state that I think there is another problem that can be very well considered even if the engineers cannot act immediately on the engineering problems.

Senator KERR. I am not ready to take a position as to whether this job should be done, but I am in the frame of mind that I am positively convinced if it is to be done, it cannot be done without the engineers' participation.

Senator SALTONSTALL. I think they have got to assist. I agree with you.

Senator CASE. Mr. Chairman, it seems to me from a practical viewpoint, there is some value in improved weather warning. It is not a matter of knowing that the property is going to be smashed, but they can batten the hatches and move their automobiles.

Senator KERR. I think there is great value.

Senator CASE. And move their furniture, move the people.

Senator KERR. But I think the complete solution of that would leave them with their problem still unsolved.

Senator CASE. That may be, but when I was at Wilmington, the local people were pointing out to me that the houses that survived were the houses built on pilings, but the houses washing away were houses clear down to the ground; but there were several instances where houses built on pilings had survived.

Senator SALTONSTALL. Mr. Chairman, stating to the distinguished Senator from South Dakota and the Senator from Oklahoma, the present Secretary of Commerce in the 1938 hurricane, his house went completely off the island and was moved very considerably, and his garage with two cars in it and a family went across the water half a mile, and luckily went inland rather than out to sea.

That is a case where an improved warning system would have been beneficial. Those automobiles could have been taken out of there, and the family can be moved, and that is what we tried to do in 1944, and it succeeded in spite of the resistance of some people to leaving their homes.

Thank you very much.

Senator BUSH. Thank you, Senator, very much, and we appreciate your coming up and hope maybe you will be able to come down tomorrow morning.

The committee will now hear Mr. Richard B. Young.

STATEMENT OF RICHARD B. YOUNG, VICE PRESIDENT OF THE ACUSHNET PROCESS CO., NEW BEDFORD, MASS.

Mr. YOUNG. I am rather weighted down with the exhibits to Mr. Buckley's very excellent verbal presentation here, and the presentation which I will make at this time.

Mr. Chairman and members of the committee, I am Richard B. Young, vice president of the Acushnet Process Co., New Bedford, Mass., and we were also, like Mr. Buckley's company, subjected to quite a bit of damage. And I am general manager of their molded rubber division.

Acushnet Process Co. employs approximately 1,450 and manufactures golf balls and molded mechanical soft rubber parts.

Like other industries in New Bedford, Acushnet has participated in defense work to a major degree and during World War II, we received five stars on our Army-Navy E flag for outstanding performance.

Mr. Buckley has just described to you the extent of damage to industry caused by both high winds and high water along the waterfront of the New Bedford Harbor. We are informed that the three cities along the Atlantic coast which were hit the hardest in the 1954 hurricanes were New Bedford, Mass.; Providence, R. I.; and New London, Conn.

We understand that other communities like ours are taking definite steps towards self-protection as much as possible.

In order to coordinate this effort, we have formed in New Bedford a committee known as the New Bedford Committee on Hurricane Damage composed of the 35 industrial plants which were subjected to high water during Hurricane Carol.

These plants have agreed they will exchange engineering information and assist each other in the methods to be used to make the plants as watertight as is possible.

Incidentally, Mr. Buckley has pointed out that some plants are capable of being made watertight, and some are not. It is unfortunate that all are not.

This, of course, is going to cost a lot of money and to a certain degree will make the buildings less efficient and will eliminate much needed light and ventilation.

The 35 industries which formed the committee are made up of both large and small companies and represent a total employment of 15,093 persons. I will submit at the end of my general presentation the companies involved, and I think you will find they are very substantial.

The committee has been working with city and State officials to see if a satisfactory program can be developed to give physical protection which would be more positive than the work which is being done by the individual plants.

We have found from the studies made to date that there are a variety of possibilities, any one of which would decrease the risk to the industrial plants involved and give job security.

This would also make what is now unattractive industrial space of interest to concerns which might want to move into the New Bedford area. It is felt without a complete engineering study, such as is proposed in Senator Bush's bill, S. 414, it will be impossible to determine the most effective and the most economical means of protection.

There is considerable enthusiasm among the local people, the city government, and the State government; and from preliminary talks we have had with the Army engineers we believe they are also enthusiastic about the possibility of doing a satisfactory job at a reasonable cost.

I submit for your examination exhibit A, which is a copy of the United States Geodetic Survey chart 252 showing the New Bedford Harbor and approaches. On the chart I have marked some of the proposals which have been made, and it is believed there may be others which will become apparent after a study has been made. Each of the projects which have been proposed are marked on the chart, and I would like to take a moment of your time to describe each of them very briefly.

Project A would be the replacement of the damaged and condemned Coggeshall Street Bridge with a causeway which would be built above the maximum tidal waters at the height of a hurricane.

Waters above this bridge are now open to navigation, and Senator Saltonstall has filed bill S. 868 to stop the head of navigation in the Acushnet River at this point.

Congressman Nicholson has filed a similar bill in the House of Representatives, H. R. 2866. Approximately 40 percent of the in-

dustrially employed people work north of this bridge and would be given protection.

Project B calls for building a similar causeway from the peninsula on the Fairhaven side of the river, known as Marsh Island, westward to the corner of the property owned by Revere Copper & Brass, Inc., and thence westward to the railroad embankment just south of Wamsutta Mills.

This project would afford protection for an additional 15 percent of the city's total employment. If this project were adopted, it would be necessary to stop the head of navigation at latitude 41°39′0″, and we have been assured by Congressman Nicholson and Senator Saltonstall that when their respective bills are heard they will propose to make this line the head of navigation rather than the latitude of the Coggeshall Street Bridge so that either of the above two projects could be considered.

Project C involves the possibility of filling in the open space now under the Fairhaven-New Bedford Bridge and the installation of a reinforced-concrete seawall just south of the existing roadway on the bridge. This would allow traffic to be maintained over the present road surface and would provide a barrier to stop water from going north into the Acushnet River. It would, however, be necessary to maintain openings for navigation through the drawbridge.

Project D involves the possibility of building a dam from Fort Phoenix in Fairhaven to Palmers Island, and thence to the New Bedford shore. Here again an opening must be left for shipping to enter into New Bedford Harbor. This proposal would provide protection for the fishing industry, the other waterfront industries, and private property, at the center of Fairhaven and New Bedford.

Project E involves the possibility of putting breakwaters well south of the harbor proper to reduce the amount of wave damage. It is possible a study would indicate that a high seawall from shore to shore at this point would be economically feasible as it would protect almost all of the waterfront property of both towns.

I have gone into detail on each of the projects just mentioned to indicate the need of further study before a decision is reached for the best and most economical protection for the New Bedford area.

The Army engineers have told us that in the event Senator Bush's bill, S. 414, is passed, they will be required to make a complete study of the whole harbor situation and make working models to determine the effect and efficiency of the proposed projects or any other solution that may be presented.

We understand that bill known as No. 261, which is very similar to Senator Bush's bill, has been filed with the Massachusetts Legislature by Donald J. Hurley, covering the State's participation in a study of the situation.

Mr. Chairman, I have a copy of that bill with me if you would care to have that in the record.

Senator BUSH. Without objection it will be inserted in the record.

(The above-mentioned document is as follows:)

SENATE No. 261

To accompany the petition of Donald J. Hurley and another that provision be made for an investigation and study by a special commission (including members of the General Court) relative to the minimization of future damage caused by hurricanes and other natural disasters. Harbors and Public Lands

THE COMMONWEALTH OF MASSACHUSETTS

In the Year One Thousand Nine Hundred and Fifty-Five

RESOLVE PROVIDING FOR AN INVESTIGATION AND STUDY BY A SPECIAL COMMISSION RELATIVE TO MINIMIZATION OF FUTURE DAMAGE CAUSED BY HURRICANES AND OTHER NATURAL DISASTERS

Resolved, That an unpaid special commission, to consist of one member of the senate to be designated by the president thereof, three members of the house of representatives to be designated by the speaker thereof, the director of the division of waterways, three persons to be appointed by the governor, and one person to be designated by the commissioner of public works, is hereby established for the purpose of making an investigation and study of ways and means, including the probable costs thereof, of preventing or minimizing future damage to persons and property and to the public health and safety in coastal and other areas within the town of Chilmark or within other political subdivisions of the commonwealth, which may be occasioned by hurricanes or other natural disasters. Said special commission shall be provided with quarters in the state house or elsewhere, may hold hearings, may travel within and without the commonwealth, and may expend for engineering, legal, clerical, and other assistance and for expenses such sums as may be appropriated therefor. Said special commission shall report to the general court the results of its investigation and study hereunder and its recommendations, together with maps, plans, and estimates of the cost of any projects that it may deem necessary or desirable, and drafts of legislation necessary to carry its recommendations into effect, by filing the same with the clerk of the house of representatives on or before the first Wednesday of December in the current year.

Mr. YOUNG. We have been assured that there will be the utmost cooperation between State authorities and the Army engineers. We have been in contact with the city officials of New Bedford and they wholeheartedly support not only the study but will look forward to participating in the actual construction of any protective measures.

I am submitting as exhibit B a copy of a letter dated January 25, 1955, from the Chief, Synoptic Reports and Forecasts Division, Weather Bureau, indicating that we can expect more difficulties with hurricane intensity in the future.

Senator KERR. You take the position that a prudent citizen might do well to take out hurricane insurance?

Mr. YOUNG. Sir, that might be so, but it is unobtainable as far as industrial coverage goes. In fact, in the survey we asked if it were not available at a rate not exceeding 5 percent, but, of course, that is a pretty poor one, but about 60 percent of the companies did say that they definitely would be interested.

We understand today that Lloyd's of London is not writing insurance on industrial property.

Our own company had costs of about $540,000, of which we have not settled with the insurance company, so maybe I should not say this, but I would guess that probably 80 percent of it at least would be high-water damage and uninsurable.

In addition, I am submitting as exhibit C a copy of a letter and statistics addressed to Mr. Robert A. Chadbourne, of the Associated Industries of Massachusetts, dated January 25, 1955, from the Chief of the Weather Bureau, which substantiates the information that we are now in a hurricane belt and gives statistics on the height of high water on past hurricanes.

Incidentally, that shows the frequency with which hurricanes have come up in the last 150 years or so, and definitely there is an increase.

The New Bedford Committee on Hurricane Damage has conducted a survey among the 35 members listed in appendix D, and the industrial damage caused by Hurricane Carol on August 31, 1954, amounted to a total of $9,074,683.

As explained by Mr. Buckley, this figure does not include the loss of pay to the employees, nor the loss in income because the plants were out of commission up to a month in some cases.

Of course, the hardship to employees was very great. They needed money for home repairs, and they were out of work because of the facilities being repaired.

In the copies of the New Bedford Standard-Times, which is exhibit I, you will note it was estimated that the total damage in this area was approximately $50 million; and it is interesting to note that of this almost one-fifth was industrial damage to an extent of $366,124 caused by Hurricanes Edna and Hazel. I might add that that was not all damage. A lot of it was moving it up to the higher ground, and getting it out of the reach of high water. In essence, it was lots of time and expense of moving but not actual damage.

It was found that the plants which responded to the survey are spending $1,021,000 for protection to their plants against future damages, by such measures as Mr. Buckley has mentioned.

The majority of the plants that are above the proposed protective dams have indicated they are willing to contribute to the cost of the dam to a reasonable extent if it should be necessary.

The above figures indicate a grand total of $10,461,807 of taxable income, which, of course, means that the United States Government and the State governments have already lost taxes of a substantial amount from these producing facilities.

We are submitting the following exhibits to more graphically illustrate our problem: Exhibit D, which is a list of the companies affected by the hurricanes, and which I propose to ask to have inserted in the record a little later, Mr. Chairman.

Exhibits E, F, and G are very interesting booklets which very drastically illustrate the industrial problem up there. Exhibit E is a booklet put out by the New Bedford Standard-Times showing the total damage in the area; exhibit F is a booklet put out by Aerovox Corp. showing damage to their plant; and exhibit G is a booklet put out by Acushnet Process Co. showing damage to their plant.

Exhibit H is a copy of an article from the April 15, 1955, Collier's magazine, which reemphasizes the trend toward increased vulnerability.

Exhibit I is some very interesting articles from the New Bedford Standard-Times showing what a hurricane can do to industry, and are taken from the Standard-Times issues of September 1, 2, 3, 4, 7, 8, 10, 11, and 12.

Exhibits J, K, and L are pictures showing the damage to Aerovox Corp., Acushnet Process Co., and Revere Copper & Brass Co.

To sum up our position, we believe that New Bedford is in dire need of physical protection, and while they are doing everything in their power to help themselves, we believe Federal and State participation in a protective program will be needed.

We, therefore, very strongly urge that serious consideration be given to the passage of Senator Bush's bill S. 414.

I would like to insert in the record, if I may, Mr. Chairman, exhibit D, which is the list of the 35 industries which comprise the New Bedford Committee on Hurricane Damage.

Senator BUSH. Without objection, that exhibit will be included in the record.

(The above-mentioned document is as follows:)

EXHIBIT D

The New Bedford Committee on Hurricane Damage is composed of 35 industries listed below:

Name	Number of employees	Major product
Ace Cabinet Corp.	150	Manufacturers of refrigerators, freezers, industrial coolers.
Acushnet Process Co.[1]	1,450	Manufacturers of golf balls, molded soft rubber mechanical parts, oxygen masks.
Aerovox Corp.[1]	2,200	Electronic components.
Allen Beam Co.	50	Manufacturers of textile equipment.
American Press [1]	30	Commercial printers.
Berkshire-Hathaway, Inc.[1]	1,850	Fine fabrics and curtain material.
Cameo Curtains of New Bedford	350	Manufacturers of curtains.
Colonial Textile	500	Cotton textiles.
Cornell Dublier Electric Corp.[1]	1,200	Electronic components.
Dartmouth Finishing Corp.[2]	250	Textile finishing.
Eastern Electric, Inc.[1]	300	Automatic cigarettes and food-vending machines.
Fairhaven Corp.[2]		Ladies' handbags.
Fibre Leather Corp.	66	Manufacturers of synthetic leather.
Freedman, A. & Sons [2]	400	Shoes.
Goodyear Tire & Rubber Co. of Massachusetts.[1]	350	Bicycle tires, tire repair materials, printers blankets, and safety tubes.
Lucas Foods, Inc.	125	
Macy Corp.	10	Owners of industrial property housing; miscellaneous small industries.
Masse Machine Shop	10	Industrial machine shop.
Modern Venetian Blinds, Inc.	450	Manufacturers of venetian blinds.
National Fireworks Ordnance [1]	105	
Babbitt Chemical		Manufacturers of chemicals.
Gunderson Pairpoint Glass Works		Manufacturers of fine glassware.
National Playthings		Manufacturers of rubber and synthetic squeeze toys.
New Bedford Boiler & Machine	25	Machine shop and industrial supply company.
New Bedford Gas & Edison Light Co.	482	Public utilities.
New Bedford Lumber Co.	21	Lumber.
New Bedford Rayon,[2] division of Mohawk Carpet Mills.	420	Manufacturers of rayon filament for the carpet industry.
New Bedford Reconstruction Corp.	1,150	Owners of industrial property housing; miscellaneous small industries.
New Bedford, Woods Hole, Martha's Vineyard & Nantucket Steamship Authority.	48	Operate steamship between New Bedford and Nantucket.
New England Overall Dry Cleaning & Supply.	130	Industrial cleaning service covering all New England.
New England Telephone & Telegraph	100	Public utilities.
Normandy Print Works	150	Textile finishers.
Palmer Scott & Co.[1]	125	Boat builders, yachts, Army and Navy vessels.
Revere Copper & Brass, Inc.[1]	825	Nonferrous sheets, plates, and rolls.
Riverside Development Corp.	1	Owners of industrial property housing; miscellaneous small industries.
Rhodes, J. C. & Co.,[2] division of United Shoe Machinery.	180	Manufacturers of shoe eyelets and miscellaneous specialties.
Seaplant Chemical Corp.[2]	90	Manufacturers of seaplant derivatives supplying to the chemical trade and food producers.
Wamsutta Mills [2]	1,250	Cotton and synthetic fine fabrics.
Total number of employees affected	15,093	

[1] Concern received an Army-Navy E award for their outstanding performance in the defense effort during World War II.
[2] Concern is participating now in Government work.

Mr. YOUNG. Thank you very, very much, sir, for permitting me this opportunity to appear here and testify before this committee.

Senator BUSH. We are very glad to have you here.

Mr. YOUNG. I have a letter here from Mr. Roy F. Williams, executive vice president, Associated Industries of Massachusetts. They have asked me to deliver this to you to be put into the record. It is a copy of this letter of April 15.

I will not take your time to read it, sir, but the Associated Industries is in favor of this bill.

Senator BUSH. Without objection that letter will be inserted in the record at this point, and also a letter dated January 25, 1955, from Mr. E. M. Vernon, Chief, Synoptic Reports and Forecasts Division, addressed to Mr. W. E. Flack, controller, Acushnet Process Co., New Bedford, Mass., with enclosures.

(The above-mentioned documents are as follows:)

ASSOCIATED INDUSTRIES OF MASSACHUSETTS,
Boston, April 15, 1955.

Re Senate bill 414.

CHAIRMAN, SUBCOMMITTEE, FLOOD CONTROL, RIVERS, AND HARBORS,
United States Congress, Washington, D. C.

DEAR SIR: The Associated Industries of Massachusetts composed of nearly 2,000 manufacturing members in the Commonwealth of Massachusetts strongly urges the passage of Senate bill 414, to give authority and funds to the Army Engineer Corps to study the problems of proper protection against high water damage from hurricanes, on the eastern Atlantic seaboard.

This association has made a study of the damage to industries in Massachusetts as a result of the two 1954 hurricanes. And because of the heavy damage to industry in this State, especially with reference to our industries on the seacoast, we feel that this situation warrants immediate Federal action.

Since there appears to be no accurate way of predicting the path of future hurricanes and because of the occurrence of two such major catastrophes in 1954 alone, we are of the opinion that an immediate study is necessary in order to provide proper protection for the real lifeblood of this Commonwealth—its manufacturing industries.

Since the Army Engineers Corps already has such authority for inland waterways, it would seem logical for them to have the authority and funds to study coastal waters in New England with reference to protection against damage by high tidal waters resulting from hurricanes.

We, therefore, urge your favorable consideration of this important study.

Very truly yours,

ROY F. WILLIAMS,
Executive Vice President.

EXHIBIT B

UNITED STATES DEPARTMENT OF COMMERCE,
WEATHER BUREAU,
Washington, January 25, 1955.

Mr. W. E. FLACK,
Controller, Acushnet Process Co.,
New Bedford, Mass.

DEAR MR. FLACK: We are sending along a few pamphlets and articles in reply to your inquiry of January 14. We believe the pamphlet The Hurricane will answer most of your questions in regard to tropical storms, although it does not apply to a single State as does the publication Florida Hurricanes. Actually, of course, the hurricanes of the past season (1954) in your area tend to indicate a frequency considerably greater than that indicated by records of previous years.

If you are interested in going into more detail, it is suggested that you obtain from your library a copy of the book Hurricanes by I. R. Tannehill. This is one of the most complete discussions available on this type of storm.

Very truly yours,

E. M. VERNON,
Chief, Synoptic Reports and Forecasts Division.

EXHIBIT C

UNITED STATES DEPARTMENT OF COMMERCE,
WEATHER BUREAU,
Washington, January 25, 1955.

Mr. ROBERT A. CHADBOURNE,
Assistant Vice President, Associated Industries of Massachusetts,
Boston, Mass.

DEAR MR. CHADBOURNE: As indicated in Secretary Weeks' reply to your letter of November 24, 1954, regarding the probability of hurricanes striking New England in the future, further information on storm frequencies and wind expectancies are provided in the enclosures to this letter.

Enclosure (1) indicates that the track of a tropical storm (often of less than hurricane intensity) passes close enough to affect New England on an average of once in 11.8 years, and probably would be more often if the early records were more complete. Storms of sufficient intensity to produce major damage in New England have had an average frequency of one in 26.6 years.

From the table in this enclosure, it would appear the risk of damage in the New England area is greater in late September and October than during the earlier portions of the hurricane season (i. e., June, July, or August).

Since the truly destructive winds of a hurricane are often confined to an area within 100 miles of the center a very slight westward shift of a storm track from east of Nantucket to Providence or Boston will determine whether the storm passes more or less without note or produces a disaster. The present state of our forecasting knowledge unfortunately does not permit us to predict small, though vitally important, variations in tracks more than 12 to 24 hours in advance. Larger variations, of course, are more amenable to prediction.

The tables contained in enclosure (2) indicate the wind velocities with various expectancies at selected locations in New England. These figures are for the observed winds at these locations and should not be interpreted as the maximum possible. The highest winds of a hurricane are confined to a small area near the center, and it frequently happens that the strongest winds of a storm are not recorded, simply because they are not observed even with as dense a network of stations as we have in New England.

An interim report prepared by the Rhode Island Development Council in October of 1954 on hurricane rehabilitation stresses the importance of proper planning in building programs. It would appear prudent, where feasible in any building or planning program, to consider the potential threat even though the statistically derived expectancy appears small.

The question of whether storm tracks are shifting and the expectancies are changing is receiving special attention both within the Weather Bureau and at university research offices. Mr. Jerome Namias, the chief of our Extended Forecast Section, feels that the recent increase in storms striking New England is not a random effect, but that fluctuations in storm tracks occur with changing circulation and weather regimes. In his opinion, it is possible that we entered a new regime in 1938 and a westward shift of storm tracks at latitudes north of 35° is associated with the climatic warming of the east coastal areas in recent years. This view is quite hypothetical and a great deal more research will be required before the validity of the hypothesis can be determined. Other groups have suggested that with the available data it has not been possible to define a change of tracks that has statistical significance or can be classed other than as an accident.

As new data becomes available the expectancy tables must be continuously altered. Simultaneously, research on these problems is being intensified, and we hope for new developments which will reduce the uncertainties of these storms.

There are many variables in this subject as it relates to business protection that cannot be treated in a general letter. Often competent private consultants can

provide more practical advice. In this connection you may be interested in contacting someone, such as Mr. I. R. Tannehill, 4635 Warren Street NW., Washington 16, D. C., who has specialized in hurricane work and may be able to provide consultant advice relating to your specific interests, or you may prefer to have a representative discuss the problem with a member of the Weather Bureau staff who has specialized in hurricane problems.

Sincerely yours,

F. W. REICHELDERFER,
Chief of Bureau.

Storm tracks which have affected New England

Date	*Remarks*
Aug. 15, 1635	A major storm.
Aug. 19, 1788	Do.
Sept. 8–9, 1804	Weakened by passage over Middle Atlantic States.
Sept. 23, 1815	A destructive storm.
Sept. 2–3, 1821	Severe damage western Connecticut and eastern New York.
Sept. 10–11, 1854	Weakened in passage over Middle Atlantic States.
Sept. 8, 1869	Path of destruction 60 miles wide.
Oct. 23–24, 1878	Extensive damage in New England.
Aug. 24, 1879	Very severe in Middle Atlantic States; continued weakened through New England.
Aug. 24, 1893	Severe over southern New England.
June 19–20, 1902	Only minor effects.
Sept. 16, 1903	Winds exceeded 60 miles per hour in southern New England.
Sept. 15–16, 1904	Middle Atlantic States affected more than New England.
Aug. 4–5, 1915	Not of hurricane intensity.
July 20–21, 1916	Passed east of Cape Cod.
Sept. 30–Oct. 1, 1920	Weakened by passage over Florida and Middle Atlantic States.
Oct. 18–19, 1923	Not of hurricane intensity.
Aug. 26–27, 1924	Passed just east of Cape Cod.
Oct. 5–6, 1933	Passed east of Nantucket.
June 19–20, 1934	Not of hurricane intensity.
Sept. 8–9, 1934	Crossed Long Island Sound.
Sept. 21, 1938	Enormous property damage.
Sept. 14–15, 1944	Major damage.
Oct. 20–21, 1944	Near Nantucket.
Aug. 31, 1954	Major damage.
Sept. 11, 1954	Do.

An analysis of the frequency of return of maximum wind speeds was prepared in cooperation with the Naval Aerology Branch by H. C. S. Thom of the Weather Bureau. An outline of the procedure was used and selected tables are included here:

Weather records in the United States contain only two wind observations suitable for measuring the effects of critical wind loading on structures. These are the daily maximum wind speed for 5 minutes and the daily extreme mile observations were chosen for analysis, and the analysis was limited to providing a frequency distribution of the daily mile of air having the highest velocity.

Since wind instruments have been moved at times during the period of record, resulting in changes of elevation, and it is desirable to compare records from the same elevation, all wind records were mathematically converted to a height of 30 feet. The quantiles from the frequency distribution were picked off from a mathematically constructed curve by an IBM card program calculator.

Tables of these values for selected stations in the northeastern United States follow:

Statistical analysis of extreme winds, airport and city office records

[Miles per hour]

Quantile (percent)	New Haven, Conn.	Portland, Maine	Boston, Mass.	Concord, N. H.	Providence, R. I.	New York, N. Y.	Albany, N. Y.	Block Island	Burlington, Vt.
99	89.16	101.26	106.64	79.92	71.58	100.09	67.68	89.19	78.01
95	62.86	77.23	81.30	62.38	61.19	84.12	50.45	75.75	64.72
90	53.85	68.50	72.09	55.89	57.08	77.89	44.29	70.46	59.59
80	45.84	60.45	63.61	49.86	53.10	71.89	38.67	65.35	54.67
70	41.45	55.91	58.82	46.42	50.75	68.38	35.53	62.35	51.81
60	38.37	52.67	55.41	43.95	49.02	65.81	33.30	60.14	49.72
50	35.94	50.06	52.66	41.95	47.60	63.70	31.52	58.33	48.01
40	33.85	47.79	50.26	40.21	46.34	61.83	29.97	56.72	46.49
30	31.92	45.67	48.03	38.57	45.14	60.06	28.53	55.18	45.06
20	29.99	43.51	45.76	36.91	43.89	58.22	27.07	53.60	43.58
10	27.77	40.99	43.11	34.95	42.40	56.04	25.37	51.71	41.83

Senator BUSH. Now, Mr. Dore, the comittee will be glad to hear from you.

STATEMENT OF RUSSELL H. DORE, SPEAKING ON BEHALF OF THE FIRE ISLAND EROSION CONTROL COMMITTEE

Mr. DORE. My name is Russell H. Dore, Mr. Chairman, and I am appearing voluntarily on behalf of the Fire Island Erosion Control Committee, which represents 15 communities located along Fire Island Beach, off the south shore of Long Island.

My family owns property in one of these communities, and I myself am intimately familiar with the conditions from 45 years of personal experience.

I live in Washington, and 1818 H Street NW., is my business address.

As Congressman Wainwright has said, this barrier beach is being progressively washed away, and more and more so with the increasing frequency of hurricanes, which has been mentioned several times.

The economic significance of that is not only with the value of the barrier beach itself in the communities on this beach; it is also what is behind the barrier beach.

The estimated value of the beach itself is $27 million and at the current rate of washing away, I think that subject to whatever opinion the engineers may have, I think that value could very easily be greatly impaired quite rapidly if something is not done about it.

Behind that you have some of the most important oyster fisheries of the east coast, and I am sure that everyone knows of the Blue Point oyster. They may not know that it comes primarily from Great South Bay; and if this barrier beach is seriously breached, those oyster fisheries would suffer greatly.

Through the Great South Bay, behind the beach, there is an inland waterway which is maintained by Federal funds, which is not only important for recreational purposes, but which is used for commercial purposes.

It serves fishing boats on the Long Island coast, which again would suffer if the barrier beach were destroyed or seriously breached.

Finally, along the coast of the bay on the inland side which is now protected water, due to the barrier beach, many millions of valuable structures have been erected on the assumption that it is going to be sheltered water.

If the barrier beach went and it became no longer sheltered then the loss of property along that coast would be very severe, and I am sure the Federal Government would be called upon to help with protective works, particularly around the harbor.

Therefore, both for the current situation, which is serious, and for the future, our group feels very strongly that it would be extremely valuable if the Army engineers could take this survey and could tell us what could be done to check this progressive process.

I think that we ought to say that these communities are not just sitting back and relying on the Federal Government; that they have over the years spent very substantial sums of money of their own in trying to protect this beach, but this is a matter which has to be done on a much more than an individual basis or a small-community basis if anything effective is to result.

In regard to the question of funds, I would just say that those who feel that the survey should be undertaken and should be authorized should certainly be just as ready to argue in an appropriation as they are an authorization.

Senator BUSH. Do you favor the passage of this bill?

Mr. DORE. I favor it personally as a property owner, and our group favors it very strongly.

Senator BUSH. Thank you very much, Mr. Dore.

Senator Kerr.

Senator KERR. Do you have a map of that area?

Mr. DORE. I am sorry I do not have a map, sir.

Senator BUSH. From what point on the south shore does it run east?

Mr. DORE. It runs from Fire Island east to Smiths Point about opposite Bellport. That is the area in which these particular communities are located.

There are other communities located farther east which have the same consideration, and I think that they have been generally represented by what Congressman Wainwright has said.

Senator KERR. I have been impressed by the statement you have made and the problem you referred to and also to the fact that I have had several hundred letters from property owners and citizens in that area.

Off the record.

(Thereupon, there was a discussion off the record.)

Senator KERR. Tell me this: Is not your problem one which is really larger than hurricane damage alone?

Mr. DORE. Yes, it is, sir; very definitely. There is erosion in any case, but the erosion you get in a hurricane, you get more in a day than you do out of 10 years of ordinary erosion.

Senator KERR. But you have a problem there, it would seem to me, which if it is not solved, is going to destroy Fire Island without hurricanes, is it not?

Mr. DORE. That is very true. It is just a question of the basis of destruction.

Senator BUSH. Thank you very much, Mr. Dore. Is there anything else, Senator Kerr?

Senator KERR. No. I would like for you to call General Itschner back for a few questions.

Senator BUSH. General Itschner, would you kindly come forward.

Senator KERR. The Army has indicated that they would either favor or have no objection to this legislation; is that not correct?

General ITSCHNER. That is correct, sir.

Senator KERR. I would presume that in order for you to carry out, to maintain, if the Congress gives it to you, they would have to accompany it with an appropriation designed to take care of all of the requirements of this program; is that right?

General ITSCHNER. Yes, sir; that is correct. The amount that we estimate it would cost, based upon a survey of the New England and New York area alone would be $2,800,000.

Senator KERR. I believe you said it would take 2½ to 3 years, and could take longer, did you not?

General ITSCHNER. It would take longer if we did not get the appropriations as required.

Senator KERR. Is your information such that you could advise the committee about the relative degrees to which the coastal area of the Gulf of Mexico has this same problem?

General ITSCHNER. They certainly do have a problem in the gulf and along the Florida coast, but I am not prepared to say as to the relative seriousness of the problems in the two places.

Senator KERR. What I had in mind—and my knowledge is very limited on the subject—but it seems to me, in fact, I would say that I had the impression that they have a greater number of hurricanes along the Florida coast, and Alabama, Mississippi, Louisiana, and Texas than they do up here.

General ITSCHNER. I am sure that the record would show over the past, let us say, 100 years, that the number of hurricanes striking the Florida coast has been considerably greater than the number that have struck the New England coast.

I am not prepared to say about the gulf. However, the New England area has received very severe hurricanes in the past few years which have accentuated the problem and the losses have been very great because of the greater development in general along the New England coast.

Senator KERR. Then you would feel, however, that a survey of this kind if undertaken should take into account the extent of the problem in that area, which will apply to a very much larger area than just that included in this bill?

General ITSCHNER. I am afraid that such a study would be extremely costly and would take such a long period of time, that the overall problem might better be solved in this fashion: That we go ahead with the accomplishment of the New England and New York surveys as proposed in this bill; and what we learn methods of solving the problem there that will be equally applicable, with some adjustments, in other areas.

In fact, even in this study we do not plan to go about studying every beach even though they may have been struck by the hurricane; but we plan to take sample beaches to see what can be done, and if it is feasible economically to protect them.

We also would study one or more bays, where there might be a much greater chance of providing some sort of economical protection than on the open beaches.

If we find that it is not feasible economically to protect these beaches or perhaps not even desirable because we might block them off from the ocean in some manner, that would probably be objectionable to the local people.

But the same conclusion could be applicable to the Florida coast and to the gulf coast and so on; so I think it would be preferable to make this study applicable to a limited area where they have sustained considerable damage during the past few years and then apply it to other areas.

Senator KERR. Thank you.

Senator BUSH. May I ask a question, Senator?

Senator KERR. Yes, sir.

Senator BUSH. Senator Kerr's thought was that the thing ought to be broadened so as to include the whole coastline. Your thought was that we really should not do that in the first instance; this being a study, taking a smaller area would be better; and then what you learn from that could perhaps be used to advantage elsewhere, is that right?

General ITSCHNER. That was my thought. I have recognized that there was severe damage by the very same series of hurricanes on the coast of North Carolina, South Carolina, and the southern part of Virginia.

I think, however, it would be better to concentrate in one area and try to find a solution because of the huge cost of finding the solution.

Mr. PAGE. I think there is one distinction there, and that is the heavy concentration of industry in New England, which I do not believe, except perhaps in a few places, such as in Texas, exists to such an extent.

Senator KERR. There would be no problem connected with making this a joint survey between the engineers with reference to the problem of protection and the Weather Bureau of the Department of Commerce on the other hand in connection with the problem of more adequate warning, would there?

General ITSCHNER. I think there are certainly two problems, and I see no reason why both should not be accomplished at the same time.

Senator BUSH. There are no other witnesses and no further business, Senator Kerr.

Senator KERR. I suggest we recess until tomorrow morning at 10 o'clock, and I would suggest, Senator, that we should have those interested in S. 1318 informed that we are going to start S. 524 in the morning, and that if we get through with it in time, we will go then right on into S. 1318 beginning tomorrow.

Senator BUSH. What is S. 1318?

Senator KERR. It is a bill authorizing construction of a highway crossing over Lake Texoma, Red River, Tex. and Okla.

The witnesses, as I understand it, are already in town; so if the committee will alert them, and if they can be here tomorrow, I would think that we might be able to wind up with 524 and either start or start and wind up on the other bill.

Senator BUSH. Without objection, it is so ordered.

62536—55——14

Without objection, the committee is then in recess until 10 o'clock tomorrow morning.

(Thereupon, at 12:20 p. m., the committee was adjourned to reconvene Wednesday, April 20, 1955, at 10 a. m., at the same place.)

(Additional statements received by the subcommittee for inclusion in the record of hearing are as follows:)

THE CRESCENT BEACH ASSOCIATION,
Crescent Beach, Conn., February 11, 1955.

Hon. PRESCOTT BUSH,
United States Senate,
Senate Office Building,
Washington, D. C.

DEAR SENATOR BUSH: Please accept our thanks for your letter with reprints from the Congressional Record of your S. 414 bill relative to hurricane damage along the New England coastline. Not only summer residents, but the year-around residents of Crescent Beach are very much appreciative of your interest in this matter. It is vitally important to all of us.

The waterfront of about 1,500 feet of the most valuable property of the Crescent Beach suffered severely because of Hurricane Carol. Very few beaches are blessed with beautiful trees within 25 feet of the sand. Crescent Beach is going to lose a good many of those trees unless something permanent may be done to protect those trees and sidewalks from violent storms.

We will see to it that the reprints that you sent are distributed among the property owners and the matter given full discussion at our next meeting of the board of governors, and also of the association in general.

Very truly yours,

P. C. PLATT, *Tax Collector.*

Whereas the city of Warwick, R. I., was a victim of the hurricanes of 1954, and

Whereas great damage was occasioned by said hurricanes, and

Whereas a bill has been introduced in the Congress of the United States authorizing and directing a full investigation of the problems of protecting Narragansett Bay and the southern shores of New England from hurricane tidal floods, and

Whereas the city of Warwick will receive great benefit from this investigation: Now, therefore, be it

Resolved, That this city council go on record as favoring Senate bill 524, which authorizes and directs said investigation; and be it further

Resolved, That the city clerk notify the Members of Congress from the State of Rhode Island of the desire of the city council, that said Members of Congress from Rhode Island support Senate bill 524.

A true copy of a resolution adopted by the Warwick City Council on March 31, 1955, and approved by the mayor.

Attest:

[SEAL] JOHN J. MCCABE, *Clerk.*

NARRAGANSETT BAY YACHTING ASSOCIATION,
Providence, R. I., April 25, 1955.

Senator BUSH (Conn.)
United States Senate,
Washington, D. C.

DEAR SENATOR: I am writing in the interest of the breakwater plea which the harbor commission of Bristol, R. I., has made for hurricane protection and which you have so kindly supported.

The Narragansett Bay Yachting Association represents 33 yacht clubs plus over 500 individual members whose board has empowered me to write, giving our wholehearted support to this very essential project. Not only will this breakwater benefit the town of Bristol, but yachtsmen as a whole throughout the State of Rhode Island and New England waters, as it is an important port of call for all concerned. Being the only reasonable anchorage outside of Newport on the entire easterly side of Narragansett Bay, we feel that it will be a boon

to the economy of the State of Rhode Island as a whole as well as the town of Bristol.

Your cooperation in the past and future will be most gratefully appreciated by all members of the Narragansett Bay Yachting Association.

Respectfully,

RALPH C. POTTER, *President.*

CONGRESS OF THE UNITED STATES,
HOUSE OF REPRESENTATIVES,
Washington, D. C., April 19, 1955.

Re Palmer breakwaters

Hon. ROBERT S. KERR,
Chairman, Subcommittee on Flood Control, Rivers and Harbors,
Public Works Committee, United States Senate, Washington, D. C.

DEAR SENATOR KERR: I request the enclosed statement become a part of the record of current hearings on coastal erosion survey.

I shall be pleased to provide you with more additional details as desired and, meanwhile, shall submit copies of the enclosed to the Chief of Engineers, United States Army, and any other officials you may suggest.

This plan submitted to me by Mr. Henry R. Palmer, Jr., of Stonington, Conn., concerns protection for the coastal areas of 3 States by 1 construction project. New York and Rhode Island Members have also been informed of this plan and I have reason to believe that their interest in the survey findings coincides with my own.

With every best wish,

Sincerely yours,

THOMAS J. DODD, *Member of Congress.*

STATEMENT BY REPRESENTARIVE J. DODD, CONNECTICUT

Between East Point, Fishers Island, N. Y., and Watch Hill Point, R. I., ocean waves sweep in directly from the Atlantic. Over a dozen reefs, many of which show above low tide, are scattered across this main access of erosive wave action to Connecticut, New York, and Rhode Island shores. Those residents who know this area best support a plan to construct protective breakwaters across this East Point–Watch Hill line utilizing the reefs and shallows, leaving the deeper passages such as Lords and Watch Hill Passages open to navigation.

This plan proposed by Mr. Henry R. Palmer, Jr., of Stonington, Conn., appears to merit serious consideration at this time. Apart from feasibility from an engineering viewpoint, the Palmer breakwaters would afford undisputed and urgently needed protection not only from hurricane-driven waters but from other storms which hit the area with a high degree of regularity. This system of breakwaters would protect lives and property within the entire Fishers Island Sound area extending along the coast from Watch Hill, R. I. to New London, Conn., and indirectly a much longer coastline.

Directly protected from Atlantic Ocean waves would be:

1. Watch Hill, R. I. and its harbor.
2. Little Narragansett Bay.
3. The Pawcatuck River and its valley.
4. All land bordering north of Little Narragansett Bay.
5. Stonington Borough and its harbor.
6. Wamphassuc Point.
7. Lord's Point
8. Mason's Island
9. Mystic River and Mystic, Conn.
10. Noank
11. Groton Long Point
12. Fishers Island and Fishers Island Sound

The proposed system of breakwaters would be beneficial for the following reasons:

1. To prevent a breakthrough of Napatree Point, anticipated by local seafaring people, which would permit Little Narragansett and the Pawcatuck River entrance to fill rapidly with sand;

2. To protect Stonington harbor from ocean swells which roll into it continually during easterly winds, and to offer the harbor maximum protection during future hurricanes and the regular coastal storms;

3. To protect lights and other buoys in Fishers Island Sound from the severe damage regularly suffered by such devices during hurricanes;

4. To eliminate the need of a number of channel buoys which extend along the reefs between Fishers Island and Watch Hill;

5. To afford protection to the hundreds of sport fishermen who fish from early spring until late fall in the waters of Fishers Island Sound and Middleground off Napatree;

6. To eliminate wave action which is causing erosion throughout the entire area cited in paragraph above which suffers millions of dollars from hurricane damages and considerable heavy storm damages whenever they occur.

Such properties consist of private residences, commercial fishing piers, a 5-mile stretch of the New York, New Haven, and Hartford Railroad right-of-way, a large plastics factory, two shipyards, the largest commercial fishing fleet in Connecticut, yachts and pleasure vessels, municipal beaches, State-owned property including a game preserve, the shellfish fishery, town and State and Federal roads, etc.

This proposal is made by no newcomer to the area in question. Mr. Palmer was born and brought up and earns his livelihood at Stonington, as his forebears did even before the town was founded in 1649. He knows whereof he speaks. His boat works located on supposedly protected shores within Stonington harbor have been severely damaged many times, virtually destroyed twice by hurricane-driven waters in recent years. The old harbor breakwaters no longer suffice. Even they have been damaged by wave action entering between Watch Hill and East Point, the site of the proposed new breakwaters.

This is a construction plan which benefits not Connecticut alone but Rhode Island and New York shores which the experts will confirm is suffering coastal erosion continually from that same source of direct Atlantic Ocean wave action. People unfamiliar with this southeastern corner of Connecticut do not realize that it is our only coastline unprotected by Long Island. I suggest that new construction of breakwaters first benefit the areas hit the hardest and most often.

FLOOD CONTROL—RIVERS AND HARBORS MISCELLANEOUS

WEDNESDAY, APRIL 20, 1955

UNITED STATE SENATE,
COMMITTEE ON PUBLIC WORKS,
SUBCOMMITTEE ON FLOOD CONTROL,
RIVERS AND HARBORS,
Washington, D. C.

The subcommittee met at 10 a. m. in room 412, Senate Office Building, Senator Robert S. Kerr, chairman of the subcommittee, presiding.

Present: Senators Kerr (chairman of the subcommittee), Symington, Thurmond, Bush, Cotton, and Hruska.

Senator KERR. The committee will come to order.

We have before us S. 524. It will be made a part of the record.

(S. 524 is as follows:)

[S. 524, 84th Cong., 1st sess.]

A BILL To authorize and direct a full investigation of the problem of protecting Narragansett Bay and the southern shores of New England from hurricane tidal floods

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the Secretary of the Army is hereby authorized and directed to cause to be made, under the direction of the Chief of Engineers, a complete and comprehensive examination, survey, or other investigation as, in his opinion, may be required, of damage due to hurricane tidal floods in Narragansett Bay and along the southern shores of New England, with a view to the formulation of plans for the most effective and efficient protection against such damage. The Secretary of the Army is further directed to report to Congress as soon as practicable the results of such examination and survey, together with such recommendations as he may deem advisable.

SEC. 2. There are authorized to be appropriated such sums as may be necessary to carry out the purposes of this act.

Senator BUSH. Would the chairman permit me to introduce a statement in the record by Senator Payne, on S. 414, which we heard yesterday?

Senator KERR. Yes, sir.

(The statement of Senator Payne is as follows:)

STATEMENT OF SENATOR FREDERICK G. PAYNE

It has been nearly a year since the people of New England, New York, and New Jersey were stunned 2 months in succession by the fury of those terrible twins, Hurricanes Carol and Edna. The destructive force of the hurricanes swept through the Northeast, battering homes, destroying boats and virtually leveling many coastal areas. Army engineers have estimated that damage in New England alone amounted to more than a quarter of a billion dollars.

But the cold facts of damage estimates do not tell the whole story. Lives were lost in the storms, 11 in Maine alone. In addition, thousands of lives were

jeopardized by the destruction done to navigational aids and shore protective structures. Many other persons were reduced to heartache and despair as they watched their homes, built by a lifetime of industry and saving, reduced to a pile of rubble. Others lost their means of livelihood as the storm wrecked 140 commercial boats and damaged 455 others.

I know from my own experience what the loss caused by the hurricanes meant to the people of Maine. Ninety pleasure and commercial craft were wrecked, while 370 were damaged. This was out of a total of 895 and 3,520, respectively. Damage to boats in Maine amounted to $1,200,000. All types of shore damage amounted to $1,367,000 from both storms. The loss on Maine's coastal areas totaled nearly $3 for every man, woman, and child in the State, and this, of course, does not include the severe damage done inland to homes, utility services, agricultural crops, shade trees, and forests. Total damage in Maine amounted to nearly $30 million.

There is evidence that weather patterns are changing, that the Northeast can expect more of such storms in the future.

S. 414, introduced by the distinguished Senior Senator from Connecticut, Mr. Bush, recognizes this fact and calls on the Federal Government to take action now to reduce future suffering and loss of life and property. The small cost required for a coastal survey by the Army engineers can pay large dividends both to individual citizens and to the Government itself, which suffered damage to its shore structures and installations amounting to $1,185,000. The facts make it clear that S. 414 merits the full support of every Member of the Congress.

I would like to include in the record of the hearings following this statement a summary of storm damage in Maine, which was prepared for me by the Legislative Reference Service of the Library of Congress.

THE LIBRARY OF CONGRESS,
LEGISLATIVE REFERENCE SERVICE,
Washington 25, D. C., April 14, 1955.

To: Hon. Frederick G. Payne.
From: Jean M. Brown, Economics Division.
Subject: Short Résumé of the hurricane damage which occurred in the State of Maine in the summer and fall of 1954.

Not since the hurricane of 1938 has the State of Maine suffered anything comparable to the damage inflicted upon it by the double blow of Hurricanes Carol and Edna which ripped through southern and central Maine in the late summer and early fall of 1954. This was true also for the entire northeastern coastal region. The third major destructive hurricane of the season, named Hazel, swung too far inland to be of any real threat to Maine, though inflicting serious damage elsewhere.

The full force of Hurricane Carol came to Portland, Maine, at 2:30 p. m., August 31, when winds reached a velocity of 80 miles per hour with gusts as high as 125 miles per hour. The eye of the hurricane passed 20 miles to the west of Portland and the storm headed inland toward Augusta and Moosehead Lake.

Only 11 days later, Maine was again struck a damaging blow, this time by Hurricane Edna which arrived the afternoon of September 11. It is acknowledged that of all the States, Maine bore the full brunt of Edna, its course being further to the east than that of Carol.

The severity of both Hurricanes Carol and Edna can be realized by a general account of the damage inflicted. In both storms lives were lost, crops were ruined, and all kinds of property, both public and private were either wrecked beyond repair or severely damaged. Countless trees were felled, roads were washed out, and power and telephone lines were downed. With Hurricane Carol there was comparatively little rainfall (2½ inches). In contrast to this, Hurricane Edna was accompanied by the most severe rainfall that the State of Maine has experienced in 58 years.

It is claimed that inadequate warning was given before the approach of Carol. As a result the damage to craft and sailing vessels was unnecessarily large.

It is believed that a complete report concerning hurricane damage to the State of Maine is being made by Col. Harry A. Mapes, director of civil defense for Maine. However, this report is not yet available to the Library of Congress.

The data contained below was gathered primarily from accounts given in the Portland Press Herald and the Bangor Daily News. At the time (September and October), the cost estimates of property damage were still being revised.

Loss of life

Carol: 3 dead; Edna: 8 dead.

Estimated total damage caused by Carol and Edna in Maine from $24,000,000 to $30,000,000

On September 23, Col. Harry A. Mapes said that reports received totaled $24,000,000 and that future incoming reports were expected to push the total to $30,000,000. The previous week's underestimated figure for total property damage was $17,000,000—$10,000,000 caused by Carol and $7,000,000 caused by Edna.

Crops

Carol: preliminary loss from Carol estimated at $5,000,000 by State agriculture department. Apples (MacIntoshes primarily) and corn were the only major crops expected to be damaged, as the State had already harvested its beans and blueberries.

Apples.—Most of Maine's apples are grown in a heavy belt extending through York, Cumberland, Androscoggin, and Kennebec Counties. Three-quarters of the crop was destroyed by Carol with a $1,750,000 loss. Edna caused an added 10 percent loss. Better grade windfall apples were being put on market as hurricane apples, suitable for sauces, pies, and canning.

Corn.—Corn was knocked down by both Carol and Edna, but reports were that there was a possibility that it could be harvested.

Factory corn.—This was knocked down, too. Its chances for survival were not so good.

Oats.—50 percent of Aroostock's oat crop was lost due to Edna.

Potatoes.—In south Aroostock County, 5 percent of the potato crop was reported destroyed by Edna.

Electric power

After Carol power was out in some places over a week. The majority of it was restored within a week by the Maine Central Power Co., only to be knocked out again a few days later by Edna. The damage caused by Edna was not so great as that caused by Carol.

Telephones

Carol: 35,000 knocked out of service, 15 percent of total phones; Edna: 44,000 knocked out.

Yachts

Floats, piers, craft, and sailing vessels all along the coastline were extensively damaged. Portland Yacht Club fleet suffered a loss of over $250,000. More than 50 percent of the entire fleet in anchorage were wrecked, many of them beyond repair. The Camden Yacht Club fleet suffered a comparable loss.

Fishing

As a result of Carol, fishermen's damage in loss of vessels and gear was up to around $1,500,000. All of Maine's 6,000 lobstermen lost gear.

Railroads

The Bangor & Aroostock Railroad's losses from Carol and Edna were estimated at $185,000. There were 157 washouts from Searsport to Fort Kent and Van Buren.

There were washouts all along the Maine Central Line cause by Edna. Losses from this last hurricane were estimated at $100,000.

The Boston & Maine Railroad suffered two bad washouts due to Edna, at Kennebunk and North Andover (Mass.).

Highways

Edna: Losses set at $2 million.

Trees

Carol: Estimated cost of $50,000 to the city of Portland to clear away trees blown down and damaged.

Pulpwood

The Kennebec River boom broke, releasing 50,000 cords of pulpwood. Most of it was recovered.

Senator KERR. We have reports from the Army and the Bureau of the Budget on S. 524 which will be inserted and made a part of the record.

(The statements referred to above are os follows:)

EXECUTIVE OFFICES OF THE PRESIDENT,
BUREAU OF THE BUDGET,
Washington 25, D. C., January 31, 1955.

Hon. DENNIS CHAVEZ,
Chairman, Committee on Public Works,
United States Senate, Washington 25, D. C.

MY DEAR MR. CHAIRMAN: This will acknowledge your letters of January 18 and 19, 1955, requesting the views of the Bureau of the Budget on S. 414, authorizing a preliminary examination and survey of the New England, New York, Long Island, and New Jersey coastal and tidal areas, for the purpose of determining possible means of preventing damages to property and loss of human lives due to hurricane winds and tides and S. 524, to authorize and direct a full investigation of the problem of protecting Narragansett Bay and the southern shores of New England from hurricane tidal floods.

You are advised that the Bureau of the Budget would have no objection to enactment of these bills.

Sincerely yours,

DONALD R. BELCHER,
Assistant Director.

DEPARTMENT OF THE ARMY,
March 24, 1955.

Hon. DENNIS CHAVEZ,
Chairman, Committee on Public Works,
United States Senate.

DEAR MR. CHAIRMAN: Reference is made to your request for the views of the Department of the Army with respect to S. 524, 84th Congress, a bill to authorize and direct a full investigation of the problem of protecting Narragansett Bay and the southern shores of New England from hurricane tidal floods.

The Department of the Army has considered the above-mentioned bill, the purpose of which is stated in its title.

As a result of the severe hurricanes of August 31, 1954, and September 11, 1954, throughout the areas specified in the bill, local people have expressed an interest in having the Federal Government make an investigation to determine possible means of preventing damages due to such storms.

Construing the language "southern shores of New England" to include all of the Connecticut, Rhode Island, and Massachusetts coastline, it is estimated that a study of preliminary examination scope would take 1 year to accomplish and would cost $200,000. This study would determine whether there is sufficient probability of justifying any improvement to warrant the expenditure of undertaking a detailed survey. It is estimated that a study of survey scope exclusive of the preliminary examination study such as that proposed in S. 524 would take 2½ years to accomplish and would cost approximately $2 million. The detailed survey would recommend for construction those projects considered engineeringly feasible and economically justified.

The Department of the Army has no objection to the enactment of S. 524. However, in this connection, the attention of your committee is invited to S. 414, a bill calling for a survey of the New England, New York, Long Island, and New Jersey coastal and tidal areas. Since the areas covered by S. 524 are also included in S. 414, in the event of favorable consideration of S. 414 enactment of S. 524 would not be necessary.

The Bureau of the Budget advises that there is no objection to the submission of this report.

Sincerely yours,

ROBERT T. STEVENS,
Secretary of the Army.

Senator KERR. We are honored this morning by the presence of two great Senators from Rhode Island—Senator Green and Senator Pastore.

Senator Green, would you give us the benefit of your statement?

STATEMENT OF HON. THEODORE FRANCIS GREEN, A UNITED STATES SENATOR FROM THE STATE OF RHODE ISLAND

Senator GREEN. Mr. Chairman, and gentlemen of the committee: On January 18 I introduced for myself and my colleague, Senator Pastore, S. 524, the measure which is now under consideration by your committee.

Senator Pastore and I sponsored this bill in the Senate as a result of a conference of the entire Rhode Island congressional delegation with His Excellency, Dennis J. Roberts, Governor of Rhode Island, in the executive office at the Statehouse in Providence. Companion bills have been introduced in the House of Representatives by Representatives Forand and Fogarty.

S. 524 authorizes and directs a full investigation of the problem of protecting Narragansett Bay and the southern shores of New England from hurricane tidal floods by the United States Corps of Engineers, as a basis for their recommendations and plans for efficient protection against the recurrence of such floods.

In 1938 a terrible hurricane hit New England and caused the loss of many lives and considerable property damage in Rhode Island. Again, in 1944, another hurricane visited New England and during the past year three hurricanes—Carol, Edna, and Hazel—visited New England causing considerable damage in all the New England States and also in many other States on the Atlantic seaboard south of New England.

The matter of protecting our shores is strictly an engineering problem and can best be solved by a survey such as our bill provides, to be conducted by the United States Corps of Engineers.

The press has reported several plans relative to controlling floods in the Narragansett Bay area. However, a survey by the United States Corps of Engineers and their subsequent recommendations are most important. The problem of flood control is urgent and demands immediate attention. I trust, Mr. Chairman, that your committee will consider this bill at an early date.

In attendance here today are His Excellency, Dennis J. Roberts, Governor of Rhode Island, and other residents of our State who are deeply interested in this legislation. They will present to the committee their views as to why this bill should be enacted and at an early date.

In addition, there are many who are interested but cannot attend this hearing, and so have sent me their views in the form of statements or telegrams. I wish to present these and ask that they may be made a part of the record. They are from the following citizens of Rhode Island:

Mr. Hovey T. Freeman, president and treasurer, Manufacturers Mutual Fire Insurance Co.

Prof. Charles H. Smiley, chairman, department of astronomy, director, Ladd Observatory, of Brown University.

Mr. Melvin T. Berry, president, Harborside Industrial Park, Providence, R. I.

Dr. Terrell E. Cobb, commodore, Rhode Island Yacht Club.

Mr. William J. Sheehan, executive secretary, Associated General Contractors of America, Inc.

Mr. Morris Martin, president, Rhode Island Purchasing Agents' Association.

Mr. Milton N. Gilman, president, Hopkinton-Richmond-Charleston-Exeter Chamber of Commerce.

Mr. Frank B. Baker, commander, Greenwich Bay Power Squadron.

Mr. John E. McDevitt, commander, Narragansett Bay Power Squadron.

Mr. Grafton H. Willey III, representative of Providence Retail Specialty Stores Association.

Mr. J. T. Baker, manager, W. T. Grant Co., Providence, R. I.

Mr. Herman Wasserman, Day-O-Lite Manufacturing Co., Providence, R. I.

His Honor, John Turnbull, mayor of Cranston, R. I.

Hon. William D. Longo, president, Cranston Chamber of Commerce.

Mr. Leon W. Brower, secretary, Inland Waterways Committee.

Mr. Milton A. Roy, Secretary, Rhode Island Bankers Association, Providence, R. I.

Also communications received from Carlton H. Towle, State senator; Mabel L. Anderson, of Providence, R. I.; Donald V. Hoff, president, Newport County Chamber of Commerce; John R. Cottam, president, Exchange Realty Co., Providence, R. I.

Senator KERR. The statements may be received and made a part of the record.

(The statements referred to above are as follows:)

MANUFACTURERS MUTUAL FIRE INSURANCE CO.,
Providence 1, R. I., March 30, 1955.

Subject: Flood control, Narragansett Bay area, Senate bill 524.

Senator THEODORE FRANCIS GREEN,
Senate Office Building, Washington, D. C.

MY DEAR SENATOR: I very much appreciate your courtesy and thoughtfulness in writing me your letter of March 22, advising me of the hearing in connection with flood control for the Narragansett Bay area.

I have just heard from the mayor's office that the meeting has been postponed 1 day but wil be held in the same room and at the same time. Unfortunately this prevents my attending as I must be in Chicago on that day. I had planned on being present because like many Rhode Islanders I am vitally interested in this problem.

I would ask that you insert this letter and statement in the record of the meeting.

It is my understanding that the Army engineers are recommending that they be given a sum of $2½ million to make a study of the flood problem of the southern New England coast and that such a study, with the building of models and so on, will consume 2 to 3 years time. It is my honest and sincere conviction that the people of Providence should not be asked to wait that long to get relief from another very dangerous hurricane flood which can come at any time.

As you will see by reading my statement, my conclusion is that the Federal Government should make an immediate appropriation of around $7 million for protecting the city of Providence and then go ahead with the Army engineers' plan as contemplated by your bill, of a more all-inclusive study.

As you may or may not know, the banks and other property owners are giving active thought and study to ways and means of protecting their own properties. I know that the Industrial National Bank has started on a program which may involve an expenditure of close to $300,000 for the protection of their Westminster Street properties. Part of this approval is temporarily held up until we ascertain what the attitude of the public authorities is to be.

Our own building, the Turks Head Building, has had a study made which indicates that an expenditure of well over $100,000 will be necessary to protect our property. Some of the smaller stores and shops have either moved or are planning to move out of the flooded area. A continuation of this can be a very serious thing for the high-value downtown district of Providence.

I do hope therefore, that the downtown Providence problem which constitutes about 80 percent of the total State problem, can be taken care of promptly as a separate matter because otherwise a lot of money will be spent in the downtown area by private funds which after a few years will prove to have been an unnecessary expenditure.

Thank you for the many courtesies which you have shown me in the past.

Very truly yours,

HOVEY T. FREEMAN, *President.*

STATEMENT OF HOVEY T. FREEMAN RELATIVE TO FLOOD CONTROL IN DOWNTOWN PROVIDENCE

My name is Hovey T. Freeman. I am an engineer by education and training and the president of the Manufacturers Mutual Fire Insurance Co. of Providence, R. I., the owner of a 16-story, modern office building located in the center of the downtown, high-value area of Providence. This investment stands my company well over $1 million.

I am in favor of the passage of Senate bill 524 for the reasons which follow:

In 1938 and again in 1954, the area surrounding our building was flooded to a depth of 6 feet above street grade. These two floods caused great damage to this building and its contents, to say nothing of the inconvenience to the hundreds of people who are employed in the building.

Page 27, volume 4, No. 13, Climatological Data published by the United States Department of Commerce, 1954 edition, presents a list of North Atlantic hurricanes and tropical disturbances since 1915. Table 19–B thereof shows that since 1915 there have been a total of 66 hurrricanes which have hit the Atlantic coast or a mean of 2.4 per year. Table 19–C shows that in the past 10 years there have been 46 hurricanes or a mean of 3.8 per year. Whether the frequency has increased in recent years or whether the larger number is due to better reporting is a matter of opinion. Prior to 1938 a long period of years went by with no disasterous high tides. However, recent experience shows we were living in a false paradise.

Most of these pass offshore without causing great damage. Some of these storms that have passed over the area would have resulted in serious damage from flood had they come at the same time as high tide which was the case of the 1938 and 1954 storms.

As is well known, the property owners in the city of Providence suffered tremendous losses as the result of these storms. In the case of our own building, the damage in 1938, when prices were lower, totaled well over $40,000, and in 1954 a very conservative estimate of the cost is between $75,000 and $100,000. Many other buildings and industries in the flooded area suffered large losses. The total of these losses in the downtown flooded area is estimated by engineers employed by the State to be in the neighborhood of $50 million for the 1954 flood. This constitutes about 80 percent of the total flood damage caused in the State of Rhode Island by this same flood. The problem is primarily a Providence problem, as it is the center of business and industry for the State of Rhode Island.

The people of Rhode Island are looking for help. Something must be done and done promptly. There are five possible sources from which the funds for flood protection can come:

1. From those in the flooded area.
2. From the city of Providence.
3. From the State of Rhode Island.
4. From the Federal Government.
5. From a combination of one or more of these groups.

It does not seem fair that only those who own property in the flooded area should be called upon for the entire cost. The city of Providence alone should not be called upon to pay the entire cost. The cost could be met by the State, but in this connection it should be pointed out that the Federal Government in similar situations elsewhere in the Nation where navigable waters are involved has either assumed the entire cost of improvements or the major part of the cost.

It is felt that there is every reason why the Federal Government should do likewise in this case. If the Federal Government does not assume the total cost it should at least pay half of it; the city and the State dividing equally the other half.

Following the 1938 hurricane, and again after the 1944 hurricane, I endeavored to get action by the city and State authorities and also by the Federal Government, unfortunately without result, apparently due to a lack of appreciation that what had happened once could and would happen again.

In 1953, as the result of a request on my part to the senior Senator from Rhode Island, Theodore Francis Green, the matter was taken up with the Department of the Army, Office of the Chief of Engineers. Senator Green sent me a copy of the reply he received from Brigadier General, Assistant Chief of Engineers for Civil Works, under date of July 20, 1953. You will note that this was a year previous to the 1954 flood. I quote in part therefrom:

"The maximum high water experienced to date in the area occurred during the hurricane of September 1938, when the tidal waters reached an elevation of 14 feet above mean high water. This resulted in flooding to a depth of 7 feet in the business area in the immediate vicinity of the river, causing considerable damage. However, studies made of past records indicate that a storm of this nature has a frequency of once in 75 years. A cursory study for flood protection made at the time of the storm indicated that a project could not be economically justified."

This letter to my mind showed a lack of understanding of the problems involved, an opinion justified by the fact that we have had two disastrous storms in 16 years. I therefore again wrote to Senator Green under date of July 23, 1953, stating that since the Federal Government was currently financing a large part of the cost of a new superhighway across the Providence River it seemed to me that at very little additional expense, as a part of this program of highway improvement, the design could easily be changed to run the highway across the river over a combination bridge and dam. Capable engineers at that time informed me that to do this would only add about $1½ million to the total cost. This, however, did not include the cost of certain pumping equipment which I felt to be necessary if we were to be sure that the downtown area would not be flooded by water coming from the runoff of rainfall from the area above the dam. These pumps would probably cost an additional million dollars.

Following the disastrous 1954 hurricane and flood a group of citizens knowing that time was of the essence and having suffered large losses, financed the employment of a well-known firm of engineers to come in and make a study of the problem. My company was one of the large contributors to this study. I refer to the report entitled, "A Report on Hurricane Flood Protection of Providence, R. I.," by Charles T. Main, Inc., of Boston, dated 1954. Copies thereof are available.

This report shows that a dam definitely is feasible and economically warranted and that the cost of building such a dam with its pumping equipment would be in the neighborhood of $5,600,000.

Had the authorities been willing to delay the start of the building of the Ship Street Bridge for only a few months so as to enable the flood problem to be studied, either the plans of the Ship Street Bridge could have been modified so as to be a dam as well as a bridge or the entire bridge and dam could have been relocated at the location suggested in the main report and we would have ended up with 1 structure instead of 2 and probably saved $2 million over what the 2 structures will cost.

It would of course be wonderful if flood protection could be provided for the entire southern New England coastal area, but that would involve an expenditure of perhaps $200 million and would require years of study and several years to construct.

In conclusion my recommendation would be that this bill be amended so that the job could be done in two steps, first, by immediately taking care of the desperate Providence situation by a special appropriation, and the second step would be what is encompassed in bill 524, a study of the entire southern New England shore-area flood situation.

I am not familiar with the processes of Federal legislation but one solution might be for Congress in the new legislation which is before it regarding additional funds for Federal roads, that it specifically specify that part of the funds that are allocated to Rhode Island shall be designated for use for flood-control and highway purposes over the Providence River.

BROWN UNIVERSITY,
Providence 12, R. I.

STATEMENT CONCERNING S. 524, FLOOD-CONTROL SURVEY BILL

I consider the flood-control survey bill, S. 524, of great importance to the Nation. Without doubt, sooner or later hurricanes will again strike New England. One hopes that there will be time to get ready before another big one comes.

Authorities appear to disagree on whether or not a trend has developed which will bring these disastrous storms to New England frequently in the next few years; but in any case, they will come, whether it be 5, 25, or 50 years from now.

If no real trend has developed, one can expect that on the average, about every 27 years there will be 1 year in which a single hurricane will strike New England, and about once every fourteen hundred years there will be a year in which New England will be struck by two hurricanes. If for one reason or another a natural trend has been established—and there is some evidence that this is so—then one can expect another hurricane in New England in the next dozen years and perhaps in the next two.

CHARLES H. SMILEY,
Chairman, Department of Astronomy,
Director, Ladd Observatory.

BERRY-HILL CORPORATION,
Providence 5, R. I., April 15, 1955.

Senator THEODORE FRANCIS GREEN,
United States Senate, Washington 25, D. C.

DEAR SENATOR GREEN: I deeply regret my inability to attend the hearings on on S. 524, flood-control survey bill. Prior commitments make it impossible for me to be present. I am, however, attaching a statement which I would like you to present to the committee on my behalf.

I sincerely hope that the committee will take immediate action on your bill as we here in Rhode Island are deeply concerned with the control of hurricane tidal floods in Narragansett Bay.

I am fearful that if we were hit with hurricanes as we were last year, the downtown area of the city of Providence will be a ghost town. Numerous small businesses that were wiped out after the last storm have reopened only through the cooperation of their creditors and the local banking institutions. If it should happen again in the near future, I am sure that such cooperation could not be obtained.

Therefore, if we here in Rhode Island are to continue to progress, some form of protection is absolutely vital in the Narragansett Bay area.

I sincerely appreciate your efforts in this matter and I am sorry that I cannot attend this hearing in person.

Very truly yours,

MELVIN T. BERRY.

BERRY-HILL CORP.,
Providence, R. I., April 15, 1955.

Senator DENNIS CHAVEZ,
Chairman, Public Works Committee,
United States Senate, Washington, D. C.

DEAR SENATOR CHAVEZ: I regret very much my inability to appear in person to express my wholehearted approval of bill S. 524, submitted by Senator Green and Senator Pastore. Prior commitments make it impossible for me to be present. I am taking the opportunity of expressing to you in this letter my vital interest in this proposed legislation.

I am president of Berry-Hill Corp., which owns a large industrial development, Harborside Industrial Park, along the shores of Narragansett Bay. There are 40 separate buildings in which are housed 70 individual businesses, employing 2,500 people.

I am also president of M. T. Berry, Inc., which owns large warehouses on the banks of the Narragansett Bay area at the junction of the Providence and Seekonk Rivers.

Harborside Industrial Park is still in the process of development. There are presently under construction 2 new buildings for new enterprises, and in the planning stages there are plans for the construction of 3 additional buildings. This industrial park is fulfilling a real need in the community, as it is the largest available industrial area close to the center of Providence.

On the M. T. Berry, Inc., property are located 3 large warehouses, providing 93,000 square feet of storage space for industry.

In the 1954 hurricanes these properties were extensively damaged by floodwater from Narragansett Bay. Personal property in a value in excess of $2 million was destroyed in the warehouses at the M. T. Berry, Inc., property.

The real estate itself suffered over $300,000 worth of damage. At Harborside Industrial Park, more than $1,250,000 worth of personal property destroyed and $800,000 worth of real-estate damage was suffered.

In common with many other businessmen in the area, I feel that something can be done to alleviate or minimize the threat of damage from floodwaters. The frequency with which hurricanes have occurred in this area in recent years requires that some steps be taken to prepare for the future. Other areas threatened with floodwaters have been protected. There seems to be general agreement that a great deal could be done in Narragansett Bay. I feel that it is the obligation of the Government in the circumstances to take some steps to give us some relief.

I therefore want to wholeheartedly endorse Senator Green's and Senator Pastore's bill S. 524 and to urge this committee to act favorably upon it.

Very truly yours,

MELVIN T. BERRY.

STATEMENT OF RHODE ISLAND CHAPTER, ASSOCIATED GENERAL CONTRACTORS OF AMERICA, INC., IN SUPPORT OF S. 524

Senators Theodore Francis Green and John O. Pastore of Rhode Island, on their own behalf and at the request of all public officials, many civic organizations and individual citizens of the State of Rhode Island, have introduced a bill (S. 524) entitled "To authorize and direct a full investigation of the problem of protecting Narragansett Bay and the southern shores of New England of hurricane tidal floods."

The economy of Rhode Island and adjacent areas of southern New England has for the past 6 or 7 years lagged behind that of practically all other regions of the United States. All public officials, both State and municipal, and many civic organizations have been and still are attempting to combat the many and varied reasons for the existence of this condition. Much time, money, and effort has been expended in setting up programs to retain and encourage industries now operating in this area, to attract new industries, to develop new and expand existing service businesses, and to exploit the natural resources of this area in furthering tourist trade.

To carry out these programs with any hope of success, some means must be achieved of relieving the area of the continual threat of further tidal floods. While industrial expansion is not confined to the shore areas, as much of the tourist trade necessarily is, a casual survey along the waterfront in the city of Providence and in the towns immediately adjacent thereto shows that many businesses have relocated elsewhere in this area or have closed shop entirely since the 1954 floods. Providence, of course, is the heartland of the Rhode Island and southeastern Massachusetts trading area. Obviously, if established businesses in the potential flood areas of Providence and adjacent communities consider it in their best interests to relocate away from the perviously inundated sections, new business certainly will not be attracted to them or the surrounding area.

While the actual flooded area is not great geographically, the result is untold damage to transportation, power, and communication systems which, when shutdown or disrupted, paralyze the entire regional area. The effect of the tidal floods extends far beyond the reaches of the waters. The planning for control of the floods must therefore be on a regional basis rather than on a local community basis where only stopgap methods can be used. Planning of this nature and the execution of projects resulting from it can only be carried on by the Federal Government.

RHODE ISLAND YACHT CLUB,
Cranston, R. I., March 31, 1955.

Hon. THEODORE FRANCIS GREEN,
United States Senate, Washington, D. C.

MY DEAR SIR: As you know, our club was completely destroyed by Hurricane Carol, which, of course, was only a minor issue as far as the damage obtained in the rest of the State was concerned; therefore, we of the Rhode Island Yacht Club, as property owners and yachtsmen, are deeply concerned in the control of tidal floods within Narragansett Bay.

The bill introduced by you and Senator Pastore, S. 524, has our support, and it is with great appreciation, too, that you are trying to do so much for Rhode Island and southern New England as regards this serious problem.

If we can be of any help to you, do not hesitate to call upon us.

Cordially yours,

TERRELL E. COBB, *Commodore.*

RHODE ISLAND PURCHASING AGENTS' ASSOCIATION,
Providence, R. I., April 15, 1955.

Hon. THEODORE FRANCIS GREEN,
United States Senate, Washington, D. C.

DEAR SIR: Referring to your telegram of April 14, the writer regrets that it will be impossible for him to attend the hearings on S. 524 (flood-control-survey bill) on Wednesday, April 20.

This association, together with other service and professional associations in this area, feels that flood protection is one of the most urgently serious problems facing the community and the State at this time, and that definite action should be taken at the earliest possible time to protect the future prosperity and welfare of this entire area from this menace.

We wish to commend you for your earnest efforts in attempting to obtain for us Federal assistance in overcoming this problem, and our earnest wishes for success will accompany your efforts.

Very truly yours,

(Signed) M. Martin.
(Typed) MORRIS MARTIN, *President.*

HOPE VALLEY, R. I., *April 18, 1955.*

Hon. THEODORE FRANCIS GREEN,
Washington, D. C.

DEAR SENATOR GREEN: The Hopkinton-Richmond-Charleston-Exeter Chambers of Commerce are wholeheartedly behind the Green-Pastore bill, S. 524, flood-control survey. Will you present our sentiments to the committee?

Yours very truly,

MILTON N. GILMAN, *President.*

GREENWICH BAY POWER SQUADRON,
East Greenwich, R. I., April 18, 1955.

A STATEMENT TO SENATE PUBLIC WORKS COMMITTEE

As commander of the Greenwich Bay Power Squadron of East Greenwich, R. I., I respectfully request that the Senate Public Works Committee give full consideration to the flood control survey bill, S. 524, scheduled for hearing on Wednesday, April 20.

The loss of both lives and property that have been suffered particularly along the shores of Narragansett Bay due to hurricane floods and tidal wave cannot be tolerated again.

I ask that all consideration be given to any plan which would protect the greatest amount of shoreline and property along Narragansett Bay and our coast. Approval of a plan that would protect only a given city or area is far from feasible and will not do the job that must be accomplished.

As a taxpayer I am interested in the protection of property along our entire shore line whether that property be privately owned or be a part of the huge Government installations. .

I therefore ask full consideration for the Dahl plan as presented by Mr. Ed Dahl or any similar plan that would protect our entire shoreline.

Respectfully submitted.

FRANK B. BAKER,
Commander, Greenwich Bay Power Squadron.

NARRAGANSETT BAY POWER SQUADRON,
UNITED STATES POWER SQUADRONS,
April 18, 1955.

Hon. THEODORE FRANCIS GREEN,
Senate Office Building,
Washington, D. C.

MY DEAR SENATOR GREEN: Speaking as the representative of the 2,500 members of District 14 of the United States Power Squadron (which district includes all of Rhode Island plus the south shore of Massachusetts including Cape Cod), may I heartily endorse Senate bill No. S. 524.

The hurricanes which have swept the southern New England coast make it extremely necessary that remedial steps be taken to lessen the destructive results of these hurricanes to the pleasure boat owners of this district.

Tremendous losses were suffered last year by the host of boatowners through the destruction and damage to their boats. Only the Army engineers are equipped and able to evolve the correct solutions to the problem.

We unanimously urge the passage of bill S. 524.

Very truly yours,

LEON W. BROWER,
Chairman, Legislative Committee, District 14, United States Power Squadron.

SWAN, KEENEY & SMITH,
Providence 3, R. I., April 18, 1955.

Hon. DENNIS CHAVEZ,
Chairman, Senate Committee on Public Works,
Senate Office Building, Washington, D. C.

SIR: The following brief statement is submitted by me on behalf of the members of the Providence Retail Specialty Stores Association representing the smaller merchants and retail outlets of Greater Providence.

Providence is the second largest city of New England, the capital city of the alert industrial State of Rhode Island, steeped in the early history of this country. As was the custom of those days, it was built on the banks of one of the several rivers which flow into Narragansett Bay. The entire downtown area of Providence lies in the small valley through which the river flows but a few feet above the high tide level.

Nearly all of the retail and a substantial part of the wholesale business of the city is done in a compact area approximately 10 blocks long and 5 blocks wide of which 7 blocks in length are under flood area.

I will not dwell on the storm potential except to underline the fact that whether Providence goes under water from any particular storm of hurricane force which comes up Narragansett Bay depends almost entirely on timing. If the height of the storm coincides with high or incoming tides, we have water. The water comes with and leaves with the tide. Therefore, our problem is to contain the onrush of storm-driven waters for a maximum period of 4 hours and a maximum rise of approximately 20 feet. The type of protection, its placing and financing we will leave to those more expert in these fields. Our urgent need is for some protection as soon as possible.

The damage done to a city of the size and age of Providence is something impossible to reduce to words. Many of the smaller businesses on first-floor levels were wiped out to the last item of inventory for the second time in 16 years. Consider in your mind the various types of stores you have been in during the last few months; then consider what filthy bay water laden with salt, acid, silt, sewage, and dyes would do to those same stores.

Unlike river water this water rots steel and wood alike. Plaster bubbles and crumbles from walls. Steel and iron rust and other metals continue to corrode after numerous cleanings and refinishings. Today, 8 months after Carol the city hums with repairs being made to not only our oldest buildings which fail to stand the pressure, but some of our newest as well.

Safes containing thousands of watches were completely under water, every watch a total loss except for the few pennies worth of gold in a case. Stocks of food, paper goods, clothing were condemned and destroyed for health reasons. Thousands of dollars worth of merchandise was as badly damaged as to have no salvage value. Add to this loss of fixtures suffered by the same merchants, loss of business suffered by the entire State while all business comes to a standstill and you have a faint picture of the economic damage which is beyond measure.

The problem is one we cannot face alone. We must call on the Government for assistance and since it involves a problem with which the Army engineers are well acquainted, we are calling on the Federal Government for assistance.

The corps has estimated that it will take 1 year for a preliminary survey and 3 years for a complete survey as proposed in this bill.

Gentlemen, we respectfully urge that the problem as it relates to Narragansett Bay can be and should be isolated and attacked as a separate problem. Although Rhode Island has miles of exposed coastline, our economic heart and the fountainhead of our health and wealth, Providence, is in grave danger of suffering severe and permanent damage. Should we experience another storm of the measure of Carol in Providence within the next 5 years without flood protection I submit that this problem will be entirely academic for fully 25 percent of flood-area merchants.

Many who remain have lost their reserves and their capital. Many are in business today through the openhanded generosity and leniency of our banks and lending institutions which loaned many thousands on the strength of past records and not assets. Many others are open with the Small Business Administration as a chief partner. But there is a limit, and we believe it has been reached. One more major flooding and Providence will suffer economic reverses it will take years to recoup.

As for cost. The most expensive plan proposed to control our floodwaters would not cost a fraction of the inventory losses suffered in Providence alone. It would not cost more than a fraction of the total taxes paid by the business interests of the same downtown areas in 1 year's time.

We have not dwelt at length on this problem in terms of statistics, rates of flow, and so forth. We are satisfied from the engineering statistics offered by the city and State and by the tremendously more complex problems solved by the corps in other areas of the country that this is a problem they can solve, with dispatch befitting its urgency.

We are afraid to gamble on each season's hurricane offerings and urge your consideration of separate treatment for the city of Providence.

Our need is immediate.

Respectfully yours,

GRAFTON H. WILLEY III.

PROVIDENCE, R. I., *April 19, 1955.*

Hon. THEODORE FRANCIS GREEN,
Senate Office Building, Washington, D. C.:

Imperative that immediate action be taken for flood control in area of Narragansett Bay.

W. T. GRANT CO., No. 48,
J. T. BAKER, *Manager.*

PROVIDENCE, R. I., *April 19, 1955.*

Hon. THEODORE FRANCIS GREEN,
Senate Office Building, Washington, D. C.:

Full investigation to protect Rhode Island from hurricane tidal floods of the utmost importance.

HERMAN WASSERMAN,
DAY-O-LITE MANUFACTURING CO.

PROVIDENCE, R. I., *April 19, 1955.*

Senator THEODORE FRANCIS GREEN,
Senate Office Building, Washington, D. C.

DEAR SENATOR: Will you kindly present to the Senate Public Works Committee my personal opinion that prompt and adequate Federal support of a flood-control survey and implementation thereof is imperative if the people of Rhode Island are to be protected against a possible repetition of last year's disasters.

JOHN TURNBULL, *Mayor of Cranston.*

62536—55——15

PROVIDENCE, R. I., *April 20, 1955.*

Senator THEODORE FRANCIS GREEN,
Senate Office Building, Washington, D. C.:

Relet the Cranston Chamber of Commerce unanimously endorsed Senate bill 524 for flood-control survey and wish for a speedy enactment of same.

WILLIAM D. LONGO, *President.*

STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS,
April 18, 1955.

Hon. THEODORE FRANCIS GREEN,
Senate Office Building, Washington, D. C.

MY DEAR SENATOR GREEN: This committee wishes to endorse bill S. 524. Something must be done to preserve the southern shores of Rhode Island and Narragansett Bay from the destructive force of the reappearing hurricanes. Only the Army engineers are capable of arriving at the proper solution.

We suggest that the following possibility be explored—If our inland waterway were dug along the southern shore of Rhode Island, the great amount of earth removed might be piled along the beaches, thus forming a great barrier to the action of ocean waves.

This committee hopes your bill will receive favorable consideration.

Very truly yours,

LEON W. BROWER,
Secretary, Inland Waterways Committee.

RHODE ISLAND BANKERS ASSOCIATION,
April 19, 1955.

Hon. THEODORE FRANCIS GREEN,
Senate Office Building, Washington, D. C.

MY DEAR SENATOR GREEN: As you know, the Rhode Island Bankers Association has wholeheartedly endorsed a resolution passed by the Providence Chamber of Commerce urging that immediate steps be taken to provide protection against future hurricanes that might imperil the lives and property of the citizens of the State of Rhode Island.

We have not only witnessed the hurricane destruction of our own properties, but as bankers we are keenly aware of the similar losses suffered by many of our customers.

As a result of the 1938 hurricane many small-business firms in our State were all but wiped out. With a display of real courage many businessmen strived to recoup their loses only to suffer a similar fate as a result of the 1954 hurricanes. It is apparent that many concerns simply cannot survive another hurricane.

Since recent events have demonstrated that the State of Rhode Island is in a path that future hurricanes may follow, it is imperative that immediate steps be taken to provide proetction.

We respectfully urge the Committee on Public Works to give careful consideration to your bill S. 524, with the hope that action will be taken to make flood control a reality here in Rhode Island at the earliest possible date.

Respectfully yours,

MILTON A. ROY, *Secretary.*

STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS,
SENATE CHAMBER, *April 19, 1955.*

Hon. THEODORE FRANCIS GREEN,
Senate Office Building, Washington, D. C.

DEAR SENATOR GREEN: I very much regret that due to the probable prolongation of this session of the legislature, I shall be unable to attend the hearing to be held on your bill S. 524 on April 20.

I favor this engineering study bill for two reasons: First, it proposes a study of the Narragansett Bay area which has not heretofore been made; secondly, it proposes a study of the southern Rhode Island shore, which I feel sure in large part will reaffirm the conclusions and recommendations reached in a previous study made by the Beach Erosion Board under the Corps of Engineers,

Department of the Army, dated, August 29, 1949, and titled: "South Shore, State of Rhode Island, Beach Erosion Control Study."

In connection with the previous study, I would like to point to the wisdom contained in the report where in paragraph 87 reference is made to the danger to human life by the absence of an escape road from the Jerusalem-Matunuck areas. During Hurricane Carol it was in this area that four lives were lost, the only ones lost on the southern Rhode Island shore.

I believe that when recommendations are made as a result of further study, considerable weight should be given to evaluating the position of the Federal Government in assisting financially in protecting our shore areas, whether publicly or privately owned, and which should not be considered as improvements.

I am sorry that at this time I am unable to present my opinions on the matter personally or more fully, and thank you for allowing me to do so in this manner.

Sincerely yours,

CARLTON H. TOWLE.

SOUTH KINGSTOWN.

PROVIDENCE, R. I., *April 20, 1955.*

Senator THEODORE F. GREEN,
Senate Office Building, Washington, D. C.:

Urgently request passage of bill S. 524 and consideration of Dahl plan for hurricane protection.

MABEL L. ANDERSON.

EAST GREENWICH, R. I., *April 20, 1955.*

Senator T. F. GREEN,
Washington, D. C.:

Urge your support on legislation that will result in protection of all Narragansett Bay from high water during hurricane period and urge that extreme consideration be given plan proposed by Mr. Edward Dahl.

EAST GREENWICH TOWN COUNCIL,
RAYMOND CROMPTON,
Council President.

NEWPORT, R. I., *April 18, 1955.*

Senator THEODORE FRANCIS GREEN,
Senate Office Building, Washington, D. C.:

Unable attend hearing flood-control-survey bill April 20. Newport County citizens much concerned over possibility of recurring flood damage. Proposed survey will undoubtedly bring out much-needed answers to this problem. Newport County looking for favorable action by committee.

DONALD V. HOFF,
President, Newport County Chamber of Commerce.

EXCHANGE REALTY CO.,
Providence 3, R. I., April 15, 1955.

Mr. THEODORE F. GREEN,
Senator from Rhode Island,
Senate Office Building, Washington, D. C.

DEAR MR. GREEN: I'm enclosing a statement as you suggested, which you could probably discuss with your committee. I am still planning to join you next Wednesday.

May I take this opportunity to thank you for your kind consideration.

Sincerely,

JOHN R. COTTAM, *President.*

The Exchange Realty Co. is a Rhode Island corporation founded in 1924. It is the lessee of properties occupied by retail stores and offices located at 75 Westminster Street and 36 Exchange Place, Providence. These properties have a total assessed value by the city of Providence of $546,220. Taxes paid during the past 10 years amount to approximately $155,000.

I, John R. Cottam, am the president as well as the principal stockowner of Exchange Realty Co., and I hereby petition that some positive action be taken

to protect my own as well as all similar property owner's investments from the financial hazards caused by the city being inundated by the waters of the Providence River. To cite examples of such a hazard, the flood of 1938 cost Exchange Realty Co. $25,000, while that of August last cost $30,000. The store owners at this property had a loss of at least three times over these amounts. It can be readily understood that such expense cannot be endured indefinitely.

In addition, the tenants and storekeepers of downtown Providence who contribute in many ways to the general welfare of not only Providence but of the surrounding communities are beginning to consider the wisdom of moving to higher ground. In fact many have already done so. It has reached a point where not only they and myself fear the result of actual flooding, but also the fear of potential flooding whenever a hurricane is reported off our southern shores. Even if no flood occurs, preparations against possible damage can be both costly in themselves as well as a loss to business while the necessary sandbagging and boarding is being carried out.

I know, of coure, that there is nothing new in what I have told you. You, as a Senator of the State of Rhode Island, are far better aware of the devastation caused by these floods and will heartily agree with me that something should be done in the near future to assure us that either the Federal or State Government or both do all that is within their power to give the necessary protection so urgently needed.

In the interim and until such safeguards are assured, would it be possible for some form of devastation insurance, similar to war-risk insurance, be made available against flood damage? As you know, no regular company is willing to underwrite this risk. Such insurance would do much to allay the uneasiness now existing here in the city. In regard to protection of Rhode Island and South Shore, a road could be built from Watch Hill to Point Judith section. A high road about 12 feet high which would protect all the shoreline if built about a quarter of a mile from shore. We could have ramps leading up from the shore to the road.

I understand the road from Watch Hill is going to be continued, and it could be switched around to serve a double purpose. I think this is financially possible if it's connected with the road project. It would be a wonderfully scenic road.

I hope the foregoing remarks will be of assistance to you and the members of the Senate Public Works Committee. If there is anything further I can do at any time, do not fail to call on me.

Senator GREEN. I would like to suggest those who are here to testify. First my colleague, Senator Pastore, the cosponsor of the bill. Then His Excellency, Gov. Dennis J. Roberts, of Rhode Island; Mayor Walter H. Reynolds, Providence, R. I.; Mayor Joseph Mills, Warwick, R. I.; John Clemens, vice president, Providence Chamber of Commerce; A. Perry Avery, vice president, Providence Chamber of Commerce; E. T. Dahl, president, Hammel-Dahl Co., Warwick, R. I.; Arthur Gervasini, town clerk, Westerly, R. I.; Judge James O. Watts, Narragansett, R. I.; William Leslie, Jr., director, chamber of commerce, Wakefield, R. I.; Nathaniel Smith, Jr., director, chamber of commerce, Wakefield, R. I.; Frank L. Martin, town solicitor, Bristol, R. I.; Roswell S. Bosworth, Jr., chairman, harbor development commission, Bristol, R. I.; John R. Cottam, president, Exchange Realty Co., Providence, R. I.; and Theron S. Curtis, chairman, Providence hurricane protection committee, Building Owners and Managers Association.

That is quite a list.

Senator KERR. We will be delighted to hear them, sir.

Senator GREEN. If at any time you feel what they are saying has already been well said, you are at liberty to remind them. I trust they will be heard in part at least.

Senator KERR. Yes, sir, they will. Thank you, Senator.

Are there any questions?

Senator BUSH. I have no questions.

Senator KERR. Senator Pastore?

STATEMENT OF HON. JOHN O. PASTORE, UNITED STATES SENATOR FROM THE STATE OF RHODE ISLAND

Senator PASTORE. First of all I express my gratitude to the distinguished chairman of this subcommittee, through whose courtesy I am permitted to be here this morning.

I also take this occasion to express my gratitude to members of the staff of this subcommittee who have so graciously cooperated with the members of my office in making the proper arrangements for some of the witnesses to be here this morning.

I am not going to dwell on the intimate facts that are connected with the hurricane situation of Rhode Island because we have so many distinguished men from our State who are here to testify this morning, who are much more familiar with the situation, and who are better equipped and have more knowledge pertaining thereto which would be of service to this committee.

I say to the chairman of this subcommittee that it must be quite evident to him that because of so many coming here this morning from every part of our State I think demonstrates quite graphically the interests of our people and the fear of our people that this catastrophe may visit us again in the near future. We pray to God that it will not happen, but we are realistic enough in Rhode Island to know that because it happened in 1938, and because it happened again in 1944, and that because it happened to us several times this past year, it is quite likely that it might come to visit us again in Rhode Island.

We in Rhode Island perhaps will never know exactly how much the damage is, or was, that was caused by the hurricanes of 1954. But it is safe for me to say that it runs in the millions and millions of dollars.

In the city of Providence alone it was in excess of $50 million. We realize there is a State interest in the matter, and we realize that there is a municipal interest in it, but we maintain also that there must be a Federal interest.

What we are proposing to do is to have a Federal survey made by the Corps of Army Engineers of our Narragansett Bay and other tributaries so that the damage caused by the tidal floods might be eliminated should this freak of nature visit us again in the future.

We have no pride of authorship on the bill that we introduced, S. 524, introduced by Senator Green and myself. It is confined strictly to the situation as it pertains chiefly to Rhode Island. We are cognizant of that. It was brought to our attention that there was a bill introduced by Senator Bush, S. 414, which is broader in scope, and because it is broader in scope I am perfectly willing to wholeheartedly support the Bush bill. If this is going to be even broadened further I am perfectly willing to subscribe and support any bill which will be broad enough in scope to investigate and survey all the facets of the problem that confronts us so that one day we can bring about the solutions that will alleviate and eliminate this terrific catastrophe.

We lost a tremendous amount of life in 1938 in Rhode Island. We lost some life in 1944. We lost 19 lives in 1954.

This is a serious problem to us. Our people are in a state of apprehension over it. We feel that something must be done and we ask the members of this committee to do it as quickly as possible. We know that you will give it your serious and conscientious attention and

we have every hope that when the final product comes out of this committee it will be the proper legislation which will empower and authorize the Corps of Army Engineers to come up with the proper plan to do the right things so that we can avoid any such terrific damage in the future. We feel that the Corps of Engineers is the only Government agency that can do this job thoroughly.

I want to thank again the members of the subcommittee for allowing me to speak to them this morning.

Senator KERR. We are delighted to have you, Senator Pastore.

Are there any questions?

Senator Symington?

Senator SYMINGTON. No questions, Mr. Chairman.

I would like to ask a question of my distinguished colleague from Connecticut, Senator Bush. Have these two distinguished Senators from Rhode Island, Senator Bush, covered most of the ground that was covered yesterday?

Senator BUSH. Yes; very concisely and very clearly. Both Senators certainly did.

Senator SYMINGTON. Of course their problem is comparable to your problem.

Senator BUSH. I was about to say that I certainly congratulate them on a very clear and effective statement which they have made in connection with this whole matter. I appreciate their broad approach to it and the cooperative attitude toward it as I think in that way we can get a bill that will give us all some benefit.

I said to the Senators before you came in that the developments of yesterday suggested the scope of this bill might be broadened, that we might delete reference to New England, Long Island, New Jersey, so as not to make the bill restrictive, but to leave it to the Engineers to use their judgment where the most urgent need for beginning this investigation was. That seems only fair. In that way we would perhaps broaden the support of the bill. That is very desirable.

Senator SYMINGTON. Could I ask the Senator if the question of weather warning came up also?

Senator BUSH. As a result of the Senator's questioning yesterday the meteorological people are here today to testify. I presume the chairman will call on them after the witnesses from Rhode Island are heard.

Senator KERR. Yes.

Senator SYMINGTON. Mr. Chairman, I have a letter from the junior Senator from Massachusetts, Mr. Kennedy, which is addressed to the committee. At the appropriate time I would like to read that letter into the record.

Senator KERR. That is very fine. When we have heard from the Governor we will be glad to have that done.

Senator Cotton?

Senator COTTON. I have no questions, Mr. Chairman. I would like to have the record show, as it did yesterday, that as a New England Senator on this committee I most certainly associate myself with the Senators from Rhode Island and Connecticut in this very necessary bill. I would be glad to see it extended down the coast, but I respectfully call attention to the fact that our southern brethren will be taking advantage of New England ingenuity and coming along with our bill. And I think the people of Connecticut, Rhode Island, and

all New England should appreciate the fact that these Senators have these bills in and are so alert to this situation. * Later in the committee I will have something more to say.

Thank you, Mr. Chairman.

Senator KERR. Thank you, Senator.

Is that all, Senator Pastore?

Senator PASTORE. It may be somewhat redundant to the question asked by Senator Symington and answered by Senator Bush, but I express my own sentiment and I think I am expressing the sentiment of my colleague when I say that we certainly have no objection to the scope of this bill being broadened because we feel that having sensed and having experienced this terriffic catastrophe in 1954 our heart goes out to other localities that have had the same experience. If they feel they should be included I certainly will support that. I think it should be done.

Senator KERR. Thank you, Senator Pastore.

Governor Roberts, we welcome you and will be glad to hear from you.

STATEMENT OF HON. DENNIS J. ROBERTS, GOVERNOR OF THE STATE OF RHODE ISLAND

Governor ROBERTS. Mr. Chairman and members of the committee, I am deeply appreciative of the opportunity that you have afforded me to come here this morning and express the views of the people of Rhode Island on a matter that is very critical and serious. I want at the outset to express my appreciation to the chairman and to members of the committee for their kindness and their patience, and also to express the appreciation of the people of Rhode Island to Senator Green and Senator Pastore and our Members of Congress for the interest that they have shown, for their kindness in coming to my office some months ago, and the many days and hours that they have spent on a matter that is of deep concern to our people.

I intend to be very brief, Mr. Chairman, because I know that you have heard many of the pertinent facts yesterday and will hear them again today.

I do want you to know that I appreciate the opportunity to put before you the critical need of Rhode Island for prompt and effective action to protect our coastal areas from the recurrent devastation of hurricane tidal floods.

The awful violence and destructive power of a full-scale hurricane accompanied bytidal floods must be experienced to be appreciated. But for the benefit of those of you who have been fortunate enough to escape this experience, I should like to attempt to depict, very briefly, what they have meant to Rhode Island.

In our worst hurricanes, such as those in 1938 and 1954, 75- to 100-mile-an-hour winds combined with tidal waves to sweep floodwater over our coastal lowlands. The water reached a height of 13 feet above the normal high-water mark. The greater part of the damage was done by floodwater which inundated streets and highways, homes, stores, offices, factories, and power plants.

Thirty-eight hundred homes were destroyed, and from 35,000 to 40,000 people were forced to evacuate danger areas. Electric power and telephone service were cut off in many sections for a week or more.

Drinking water and major food supplies were contaminated in some communities.

Thousands of Rhode Island workers were idled by plant shutdowns resulting from water damage and power failure. National Guard units were called out, and stayed on duty from 7 to 9 days in the hard-hit coastal communities, maintaining order, manning mobile generators, and helping to deliver emergency supplies.

Nineteen died in Rhode Island during the 6 hours of Hurricane Carol, on August 31, 1954. Most of these drowned when caught by tidal floods. If this storm had not struck near midday, the death toll would undoubtedly have been much higher. The hurricane of 1938 caused 262 Rhode Island deaths.

Repetition of such devastation is what we seek to prevent. In this connection, the major points I should like to make are these:

(1) Of all the States on our northeastern seaboard Rhode Island has been the most seriously affected by hurricane tidal floods of recent years, particularly those of 1954.

(2) While we can expect recurrence of devastating hurricane tides, we cannot tell how soon the next one will strike. It is therefore quite possible that even the speediest effective action will be too late to prevent major flood damage from the next hurricane to strike our shores—and damage from that one storm might well exceed many times over the entire cost of practical, preventive measures which would protect major Rhode Island population and industrial centers for generations to come.

Every month's delay in tackling the problem brings that unfortunate possibility closer to the reality. What we need is not preliminary surveys—for the State of Rhode Island, at least, these have already been made. We must have a complete study and adequately documented, authoritative engineering recommendations at the earliest possible date.

(3) The required protective measures are necessarily a Federal responsibility. The Federal Government has long recognized flood control as being within its province. In the past, for example, there has been Federal participation in hurricane flood control at Galveston, Tex., and Lake Okeechobee in Florida.

Moreover, the Federal Government has a direct financial stake in preventing hurricane damage. Due to the three hurricanes which struck the northeastern coast in 1954 the Federal Government had to spend over $9 million in disaster grants to local communities and disaster loans to small business. This was over and above losses in revenue from personal and corporate taxes. There were unmeasured additional costs to various Federal agencies for emergency services and supplies.

Disaster relief cost the American Red Cross over $1 million.

Federal responsibility is particularly evident in Rhode Island's situation, where the most practical and effective means to minimize flood damage could affect the navigable waters of Narragansett Bay—an areas which concerns ocean and coastwide shipping, fisheries, pleasure craft, and important installations of the United States Navy. Thus, even if the State of Rhode Island were prepared to take action itself, study and approval by the Army engineers would be mandatory before we could proceed. It would appear obvious that it would save

both time and money if the Army engineers handled the project from the beginning.

I have said that Rhode Island has been the State on the northeastern coast most seriously affected by recent hurricane tidal floods. In its monumental work, The Resources of the New England-New York Region, the New England-New York Interagency Committee treats the subject of hurricanes in volume 4 of chapter XXXIX of part 2.

This study conservatively estimates total damage in the 7-State region at $305 million for the 3 major 1954 hurricanes—Carol, Edna, and Hazel. The damage in Rhode Island alone was estimated at $106 million, or over a third of the seven-State total. A Rhode Island survey indicates that hurricane tidal flood damage to Narragansett Bay communities alone amounted to some $64 million or over 20 percent of total hurricane damage in the seven Northeastern States.

The dollar total of Rhode Island damage is only part of the story. Its devastating effect on the State's economy can best be seen by relating these losses to the State's income. Rhode Island hurricane losses in 1954 equaled 7.4 percent of the State's total personal income in the previous year. As a percent of income the States with the next highest losses were Maine and Massachusetts, with losses equal to 1.9 percent and 1.3 percent of income, respectively. Losses in the other four States were less than 1 percent of income. In other words, in proportion to income, Rhode Island losses were almost four times those of the next most seriously affected state.

Rhode Island's capital city, Providence, situated at the head of Narragansett Bay, is the center of the 19th largest standard metropolitan area in the United States. In this city alone, total damage was estimated at over $50 million, or approximately 8 percent of the total assessed value of all real and tangible property in the city. This damage was primarily due to extensive tidal flooding of commercial, industrial, and utility installations. Preliminary surveys indicate that most of this damage could have been prevented by proper protective dams or sea walls in the upper bay.

In view of these facts, I am sure you gentlemen can understand why Rhode Island is not sitting idly by until we are visited by another such disaster. Rhode Island is taking such action as it can. We have completed preliminary surveys of damage and possible methods of future protection. I have sponsored legislation to take over some of the more dangerous coastal areas on our South Shore for public beaches. Rhode Island towns along the coast are establishing protective zoning and building regulations. But, for the engineering and construction of major protective works, we must have Federal help.

I have said that we cannot tell how soon the next major hurricane will strike. We do know that major hurricanes have struck the southern New England coast at varying intervals since the first white settlement over 300 years ago. More accurate records are available since the establishment of the United States Weather Bureau in 1870.

Since 1900 the record shows that, on the average, severe tropical storms have struck the North Atlantic coast every 3 to 4 years, with full-scale hurricanes every 11 years. These are only statistical averages, however, and we have no positive assurance that we will have even 3 years to prepare for the next disastrous storm.

There are proposals before your committee for surveys by the Army Corps of Engineers to determine what protective construction would

be most practical and effective throughout the North Atlantic seaboard. I understand that the Secretary of the Army has estimated that the preliminary and complete surveys would together require a total of from 3½ to 4 years.

It appears probable that any protective construction recommended would require at least another 2 or 3 years. This means from 5½ to 7 years before any effective protection could become a reality. Gentlemen, we cannot afford to wait 5½ to 7 years when the record shows the probability of severe tropical storms, and possibly another full-scale hurricane within the next 3 or 4 years. Prudence dictates that, if humanly possible, we must aim at effective protection within a 3-year period.

As Governor of Rhode Island, keenly aware of my responsibilities to our hurricane-battered communities, I feel I must do everything in my power to see to it that they have the best and most practical protection before the next major disaster. I am sure that the honorable members of this committee are equally conscious of their own responsibilities, and are equally desirous of preventing unnecessary property damage, human suffering, and death.

What I respectfully urge, with all the force, and with all the persuasiveness at my disposal is this:

First, that you approve promptly surveys of the North Atlantic coast by the Army Corps of Engineers to determine what protection against hurricane flood tides are most practical and desirable.

Second, that the proposals be amended to establish priorities for different sections of the coast, according to the extent and relative economic impact of recent damage, with possible consideration, as well, of the amount of direct Federal interest, and whether or not any effective protection in the area appears capable of achievement. By any reasonable method of determination, I am confident that the Narragansett Bay region would rate top priority.

My purpose in making the latter recommendation is simply to speed up practical results. The guiding principle should be to assure completed recommendations for at least the top priority sections in less than 2 years—say not later than January 1, 1957.

While the entire North Atlantic coast is entitled to protection and should be surveyed, the time required for that enormous project is dangerously long. I consider, and it is my earnest hope that you will agree, that when the next hurricane strikes it would be far better to have real protection for the most vulnerable section of our coast, than to have mere plans for the entire area.

Again, I wish to thank the committee for this opportunity to present the very real and immediate need of Rhode Island for effective hurricane and flood protection.

Thank you, Mr. Chairman.

Senator KERR. Thank you, Governor, for that very able and forceful statement.

Are there any questions by members of the committee? Senator Symington?

Senator SYMINGTON. I will yield to Senator Bush, Mr. Chairman.

Senator BUSH. Mr. Chairman, I want to congratulate the Governor on that excellent statement. It is very clear and not in any way exaggerated in my opinion. I visited that area after the visitations

of the two ladies you have mentioned—the first two—and I certainly believe your statement is justified in every way.

The Governor referred, Mr. Chairman, to a report of the Army engineers, volume 4, part 2, on the subject of huricanes in his remarks. I would like to ask unanimous consent to place in the record at this point just the conclusions from that report. It is not a very long statement. It supports the Governor's figures of $305 million and it also gives a table breaking down as to how they got at that figure in the different States, and also as to the nature of the damage to public property, shipping, utilities, transportation, and so forth.

Then it concludes with a plan which they think is a plan of measures to cope with hurricanes. I think that would be a very interesting contribution to the record at this point, following Governor Robert's statement.

Senator KERR. That may be made a part of the record at this point:

(The document refered to is as follows:)

CONCUSIONS

163. Of the three hurricanes which entered the New England-New York region in 1954, Hurricane Carol was by far the most destructive in the region and caused the largest number of fatalities. Rhode Island and Massachusetts suffered by far the heaviest losses. Carol was comparable in intensity and destructiveness to the hurricane of September 1938, but due to better preparedness, the number of lives lost was small as compared to over 500 lives lost in 1938.

164. The losses in the region from 1954 hurricanes, as given herein, total $305,818,900, with incomplete estimates for damages in interior areas. About 75 percent of this figure is attributable to Hurricane Carol. The major portion of the total of losses was sustained in coastal areas of New England and Long Island from the combination of wind, rain, and tidal flooding. Rhode Island and Massachusetts, which have southern coasts susceptable to tidal flooding, suffered about 70 percent of the 1954 huricane damage recorded for the region. Table 100 summarizes 1954 hurricane experience.

165. Hurricane experience in the New England-New York region has not been sufficient to suggest any probable frequency of occurrence. The record of hurricanes which have involved the region points to a seasonal concentration of occurrence in the months of August, September, and October, but does not show any recurring pattern. It can be noted that hurricanes have occurred in successive months and in successive years and that periods of concentration have occurred. However, these interesting parallels do not exhibit an overall pattern of occurrence. To evaluate the chances of hurricane occurrences or probable frequency at a given site for the New England-New York region would require continuing research. Until a determination of probable hurricane frequency is made, a meaningful estimate of average annual damage at a particular location cannot be made.

166. The greatest damages from hurricanes in the whole region occur as a result of the tidal flooding which accompanies hurricanes in coastal areas. Protective measures against tidal flooding might be justified in coastal areas with high property value. Other preventive, protective, and rehabilitation measures include improved hurricane warning systems and dissemination of warnings to the public, evacuation and shelter plans coordinated by responsible State and local groups, coordinated plans for the employment of auxiliary communication and power facilities, zoning and building code revisions and provisions for easing the financial burdens occasioned by hurricane losses.

167. In general, the floods which often result from the heavy rainfall accompanying hurricanes would be protected against to a high degree by the flood-control measures already authorized in the major river basins in New England. On the other hand, there are essentially few practical measures other than the stiffening of building codes which can be employed to prevent widespread damage from abnormally high winds.

PLAN

168. The following plan of measures to cope with hurricanes is suggested:

(*a*) Wider and more expeditious distribution of hurricane warnings and advisories.

(*b*) Research to determine the risk of extreme hurricane wind or tidal effects at definite locations, whether or not they have in fact been subjected to the experience.

(*c*) Information programs to familiarize the public with the nature of hurricanes, existing warning services, and possible protection measures.

(*d*) Raflar installations for precise tracking of hurricanes on a radio frequency of about 2800 megacycles with a peak power output of about a million watts, in a system with units at Eastport, Maine; Nantucket, Mass.; Atlantic City, N. J.; Hatteras, N. C.; Charleston, S. C.; and Daytona Beach and Miami, Fla.

(*e*) Studies to determine the economic feasibility and desirability of underground placement of power and telephone lines.

(*f*) Studies to determine the desirability, and economic and engineering feasibility, of providing protection against tidal flooding in areas which have experienced heavy losses.

(*g*) Studies of individual areas subject to the devastation of tidal flooding to determine what zoning measures might be enacted.

TABLE 100—*Summary of 1954 hurricane experience, New England-New York region*

	PATH AND AREA AFFECTED
Hurricane Carol (Aug. 31, 1954)	Center crossed eastern Long Island, moved northward into southern New England passing just west of Worcester, Mass., and continued on through New Hampshire. Area affected, principally eastern Long Island and Connecticut, Rhode Island, eastern Massachusetts, and New Hampshire and western Maine.
Hurricane Edna (Sept. 11, 1954)	Center crossed Martha's Vineyard and Cape Cod, then northeasterly offshore passing close to Eastport, Maine. Area affected principally Cape Code and eastern Maine.
Hurricane Hazel (Oct. 15, 1954)	Center entered southwestern part of region passing between Buffalo and Syracuse and on over Lake Ontario. Areas affected, principally New York State, south of Lake Ontario.

DAMAGE BY STATE	
Hurricane Carol:	
Connecticut	$28,168,750
Rhode Island	87,965,900
Massachusetts	92,992,900
New Hampshire	4,128,750
Maine	5,675,000
New York	6,312,500
Total	235,243,800
Hurricane Edna:	
Connecticut	4,766,000
Rhode Island	5,672,400
Massachusetts	10,887,100
New Hampshire	1,369,250
Maine	8,756,000
New York	1,296,000
Total	32,746,750

DAMAGE BY STATE—continued

Hurricane Hazel:	
New York	5,704,200
Connecticut	147,150
New England	100,000
Total	5,951,350
Combination of storms or States	31,877,000
Total	305,818,900

1954 HURRICANE DAMAGES BY TYPE [1]

Loss of life—between 77 and 82	
Public property	$53,822,200
Shipping	12,881,000
Utilities	39,193,900
Transportation	2,800,000
Commercial	55,167,500
Industrial	38,074,500
Agricultural	29,285,100
Foods and drugs	7,278,800
Fisheries	3,786,900
Private property	59,670,000
Other [2]	3,859,000
Total	305,818,900

[1] Estimates incomplete for damages in interior areas.
[2] Inseparable combinations of 2 or more types of damage.

Senator KERR. Senator Cotton?

Senator COTTON. I have no questions. I thank the Governor for his very able statement.

Governor ROBERTS. Thank you.

Senator KERR. Senator Symington?

Senator SYMINGTON. I congratulate my old friend and distinguished Governor of Rhode Island for his splendid statement. Perhaps he knows that I spent quite a little time in a storm cellar during Carol and Edna, with the storm centers at Nantucket, so I know what he is talking about.

I was impressed with what he had to say about priorities, Mr. Chairman, if anything can be done quickly. Although the distinguished Senator from South Carolina and others yesterday talked about their States being investigated because of this great problem, nevertheless it is a fact that the hurricanes swept suddenly and hit the New England States harder than they do other places, from the standpoint of lack of preparedness and so forth.

I am inclined to agree that the investigation might be a provision in the bill, that the investigation proceed on the basis of the States which were affected the worst in percentage of their income.

Governor Roberts, as I understand your thought, that is what is behind your message; is it not?

Governor ROBERTS. That is it, Senator.

Senator SYMINGTON. Thank you, Mr. Chairman.

Governor ROBERTS. If I may, Mr. Chairman, there is another point. In talking with the New England representative of the Army engineers he pointed out this fact: That many of the coastal regions have particular geographical makeup that lends itself to hurricane protec-

tion. When they are making a study they can devise protective measures for a particular bay or inlet.

In open areas of the coast that do not have any inlets or bays and so forth, they provide difficult problems. So if the Army engineers were authorized to make this study, they would, I think, from a practical approach to it, divide the coast up into sections, and I think those sections would be determined by the natural terrain and the indentations of the coast and so forth.

The practical nature of it lends itself to a study on a practical basis of the geographical situation as it exists. We are suggesting, because of the enormous impact on the areas hit, flooded, and destroyed, on the economy of the State, that a priority system or priority consideration would be in the best interest, not only of the particular area that gets that priority, but of the general welfare of the country because when these storms do hit, the United States Government comes forth with a lot of money, millions upon millions of dollars, to our help and protection.

Senator KERR. Thank you very much, Governor Roberts.

Senator BUSH. Mr. Chairman.

Senator KERR. Senator Bush.

Senator BUSH. As a result of the questioning yesterday by Senator Symington I believe the chairman suggested that we have the Meteorological Bureau people here this morning. Knowing that these Senators probably have other engagements, I wonder if the chairman would consider, before these Senators leave, calling the Meteorological people and letting them testify so that Senator Symington and others who may have to go before we hear all the witnesses from Rhode Island might have the advantage of hearing the Weather Bureau people and questioning them on this very important question of warnings.

I move for your consideration that they be called next.

Senator KERR. I think that has merit. It was discussed here yesterday that in addition to the directive to the engineers for making a survey as to the extent of the problem and how it might be met from the standpoint of the prevention of flood damage, that the bill might be amended to direct extended and expanded studies and warnings by the Weather Bureau.

As a result of suggestions here yesterday representatives of the Meteorological Division were invited to appear. I understand Mr. Simpson, of the Weather Bureau, is here. If it is agreeable to the Senators from Rhode Island we will call him.

Senator GREEN. Senator, I think priority ought to be given to them on the same basis priority is suggested for the engineering work to be undertaken later.

Senator SYMINGTON. Would the Chair yield?

Senator KERR. Yes.

Senator SYMINGTON. What I suggested to the Senator from Connecticut yesterday was that although the actual eye of Edna went over Nantucket, the damage was much less than it received from Carol because everybody was fully warned about Edna, and not only were they not fully warned about Carol but they were told that Carol was not going to come into that part of the country.

Senator GREEN. That is very true. But the geographical situation had something to do with it also.

Senator SYMINGTON. I remember at that time that the distinguished Senior Senator from Rhode Island protested about the lack of adequate and proper weather warnings, if I am correct.

Senator GREEN. That is very true. It was improved with the next hurricane.

Senator SYMINGTON. That is right. As a result of that the next hurricane, although more severe, where I was, did considerably less damage.

Senator GREEN. That is very true.

Senator KERR. Mr. Simpson?

STATEMENT OF ROBERT H. SIMPSON, SPECIAL ASSISTANT TO THE ASSISTANT CHIEF OF THE BUREAU FOR TECHNICAL SERVICES, WEATHER BUREAU, DEPARTMENT OF COMMERCE

Senator KERR. Do you have a prepared statement?

Mr. SIMPSON. No, sir; I have not.

Senator KERR. We would like to hear from you on these points, and then the Senators will ask you questions.

First, your views as to whether or not the service of warnings with reference to storms and tornadoes would be improved, and warnings available sooner, and more generally given, and whether or not it would expedite and increase your opportunity to give that service if this bill were expanded to include directive for study and investigation and survey as to how those objectives could be achieved.

Mr. SIMPSON. Yes, sir. The Weather Bureau has been studying for a number of years the hurricane problem and the tornado problem, and what will be needed to issue more timely and effective warnings, than we have in the past.

This study has been particularly intense since our disasters of this past year, and we have formulated some rather concrete plans which we intend to propose. These will involve the investigation of both hurricanes and tornadoes, to learn more of their structure, what makes them work, and something of the energy exchanges which the forecaster must understand before he can do more than simply extrapolate the past movement of these storms.

These are things which we have not been able to come closely in touch with before because we have not had the means of searching out these storms.

Senator KERR. May I ask right here, when you say you do not have the means, you mean you do not have adequate finances?

Mr. SIMPSON. The facilities. We have not had the facilities available.

Senator KERR. Is that because of inadequate money?

Mr. SIMPSON. Well, we have not actually requested these funds as yet. We have not asked for the funds, we have not been granted the funds for this purpose.

Senator KERR. Facilities eventually reduces itself to a question of money, does it not?

Mr. SIMPSON. Yes, sir; that is correct. To learn all these facts we must have special equipment, including planes to investigate these storms. The Weather Bureau has been engaged in a small program, a cooperative program, with the Air Weather Service and with the

Navy in trying to get some of this information. We are exploring with them further expansion of this activity to get all the information needed to analyze these storms and to come up with such improvements in techniques as may be possible within the limitations of our science as we know it today.

There are other improvements which can be made and we are proceeding with them. Some of these are administrative improvements. Some simply require more personnel, more people. We are taking steps, for instance, to install powerful radars at Cape Hatteras, and at other key locations which will help us to track and keep tabs on the storm and its successive movements more adequately than we have been able to before.

We have not had sufficient staff at some places to cope with peak loads during emergency conditions. We have had enough to maintain a routine service that we feel has been satisfactory, but when emergencies arose we found ourselves short handed. We are taking steps to improve this situation. We are asking funds in our next year's budget to increase the staff at some stations.

Senator KERR. You are talking about fiscal 1956?

Mr. SIMPSON. Fiscal 1956; yes, sir. It will be in effect before the next hurricane season.

Senator KERR. At that point, have the hurricanes that have occurred affecting the New England area, as I understand the hurricanes to be in the Gulf of Mexico, occurred in a specific limited part of the year?

Mr. SIMPSON. The hurricane season is a little more limited in New England than it is in the Gulf of Mexico and Florida and southern Alantic coastal areas. Between June 1 and November 15, in general, we have our official hurricane season. There have been only 2 storms I believe which occurred in May, and only 2 I believe in December. And we had Alice in January, this year, so virtually all the rest of them have occurred between June 15 and November 15.

In New England these storms occur generally in the months of August, September, and October. The majority have occurred between the 15th of August and the 1st of October. I brought along a diagram which you may be interested in looking at later. It may highlight the problem from the standpoint of frequency of storms, including those which have been near misses as well as those which directly affected the middle Atlantic and New England States since 1820.

Senator KERR. I think the committee would be interested in that information being put in the record.

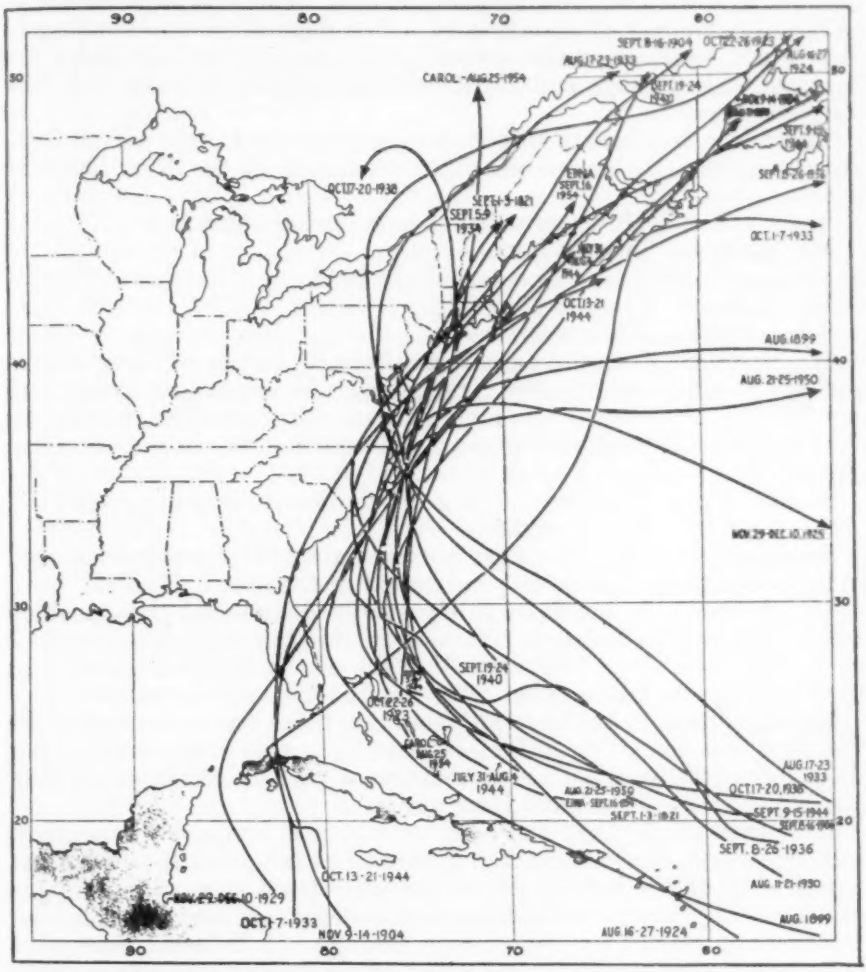
Mr. SIMPSON. All right, sir.

Senator KERR. I am sure it would be interested in the diagram. Do you have it here?

Mr. SIMPSON. I have it right here, sir.

(Referenced chart follows:)

IMPORTANT HURRICANES AFFECTING MIDDLE ATLANTIC AND NEW ENGLAND STATES - 1820 - 1954



Senator BUSH. Mr. Chairman, I would like to call attention to the language the witness uses about the hurricane season. And I put that in quotes, "hurricane season." It seems to be a very well-defined matter in the parlance of the Weather Bureau. We think of it that way, but I am interested to see that the Weather Bureau speaks of it as a hurricane season, being so well defined in New England, as August, September, and October. It points up our peril.

Senator KERR. It is a matter of record that certain months of the year have never had a hurricane, is that correct, Mr. Simpson?

Mr. SIMPSON. Yes, sir.

Senator KERR. A coastal hurricane.

Mr. SIMPSON. A hurricane which affects the coast of the United States. We have here 24 tracks of major storms. This does not represent all of the storms that could be classified as tropical storms. This is a summation of all the great storms, the potentially disastrous storms.

Of the group there you have 10 which have directly affected the Middle Atlantic and New England States. The rest have been near misses. A change of direction of a few degrees, in the heading as they move north or northeastward, could have spelled the difference between little damage and disaster for the Middle Atlantic and New England areas.

There is a very small difference here that could make all of these storms potentially dangerous and destructive in the New England area.

Senator KERR. How many do you have on this chart?

Mr. SIMPSON. Twenty-four.

Senator KERR. Covering a period of what?

Mr. SIMPSON. From 1820 to 1954.

Senator KERR. That is 134 years.

Mr. SIMPSON. I should emphasize that our listing of these storms perhaps is a matter of degree. Somebody else might go through and say that we have had a few more storms. We have had, but in the Weather Bureau's opinion these are the great, the truly destructive storms.

Senator KERR. That is an average of about one every 5½ years?

Mr. SIMPSON. That is right.

Senator KERR. Have a larger percentage of those storms occurred in the latter part of this 130-year period or the first half of it?

Mr. SIMPSON. It has been fairly evenly distributed though there was a gap during the earlier portion of this century. We have had four, of course, since 1938, including the one in 1938. Prior to that time we had one I believe, in 1933, one in 1923, and one in 1903.

Senator KERR. It has been suggested that there was an opinion in the Weather Bureau, or by others interested in this information, that these tornadoes were following a different path in recent years than had been the case 50 or more years ago.

Mr. SIMPSON. A study made by our expert in hemispheric weather, and long-range forecasting, Mr. Namias, has indicated that the great circulations of the hemisphere which steer these storms have in the past 15 to 20 years moved in somewhat different courses than has been described as normal for longer term average. A different movement in that a stronger southerly component of air, or air moving from south to north off the east coast of the United States has been present, one which tends to bring not only these storms, these hurricanes, but the coastal snowstorms of the winter season also northward into the coast of New England and the Middle Atlantic States area rather than taking a more normal course to the northeast out into the open sea as long-term averages dictate should be the case.

It is too early—either too early, or we as yet have insufficient information to say whether this trend is something which is progressive and persistent and will continue in this direction, or whether it will revert to the old type of circulation. But it is something which has

created some concern in our Bureau and something which we are studying, pursuing as vigorously as we can.

Senator KERR. Does the Bureau have as accurate information over the first 50 years of the last century as over the last 50 years?

Mr. SIMPSON. No, sir.

Senator KERR. Is it possible that the conclusions which you have indicated with reference to the change in conditions in the last two decades might be because of the more accurate and complete information, and is it possible that such a period might have occurred before with reference to which you do not have the information? Or is it the judgment of your people that the definite change has occurred or is occurring?

Mr. SIMPSON. It is the judgment of Mr. Namias—and I think his opinion is that of the Bureau—that there is a trend during the past two decades which is real in nature. Again we cannot say conclusively that our techniques in carrying out this analysis are completely accurate. We have been releasing sounding balloons to obtain figures on temperature and pressure of the upper layers of the atmosphere only since the 1930's. Prior to that time we have had to extend our study to earlier years by means of statistical manipulations based on our last 20 years of soundings to derive the information needed to study circulations of earlier years. We have confidence in our techniques. We think they are good.

Senator KERR. Three major storms have been mentioned here as having occurred and as having hit New England during the year 1954. Are they all included in this?

Mr. SIMPSON. Yes, sir; those three are there.

Senator KERR. Would that be a part of the historical data that probably has led your associate to the conclusion that the path of these storms along this coast and toward New England has changed and that it is probable that the future will see the continuation of the increased number?

Mr. SIMPSON. The three storms which we had this year are a part of the analysis and they go into the conclusions which were reached and are being extended through further study now. But we do not feel that the occurrence of three storms that seriously affected New England last year is a representative sample of what might be expected to occur year after year, of course. Even if this trend in the upper air circulation persists, we feel it was quite fortuitous that we had three storms in one year which affected the New England and the Middle Atlantic States as "Hazel," "Edna," and "Carol" did.

Senator KERR. Quite unusual.

Mr. SIMPSON. Quite unusual.

Senator KERR. You tell us that you have brought about a situation where you are in position to give earlier and more general and more accurate warnings with reference to the path of these storms. We would like to know if you feel that further progress in that line is indicated, and if you can accomplish it on the basis of your present program, or do you think that it would be well to have legislation which would provide authorization and funds for an expanded study on the part of the Weather Bureau as to how it could greatly increase that service?

Mr. SIMPSON. We feel very strongly that the Weather Bureau should have additional funds to carry forth a program of research and study

into the basic nature of these storms. We feel that to extend the time with which we can issue accurate forecasts will require first a more perfect understanding of the basic nature, the basic atmospheric structure, of these storms.

The only way we can accomplish this is through the collection and the careful analysis of data from the core of storms. Once this information is known, then the development of more accurate techniques for forecasting may follow.

At the present time we regard our hurricane forecasts as accurate and effective as much as 12 hours in advance of the storm and as much as 24 hours where the storm moves in a fairly uniform path. It is the time when the storm is almost stationary and is about to resume a rapid motion, or the time in which a storm is moving in one direction and pauses to recurve and move in another that the problem of the forecaster becomes vastly complicated.

We do not have in our possession at this time—and indeed I think no one in the world has in his possession—the information with which one can forecast precisely where a storm will cross the coast 12 to 24 hours in advance under the conditions of irregular movement I have just described.

The science of meteorology simply does not permit that now. When the storm is moving uniformly, in a uniformly carrying current in the atmosphere——

Senator KERR. You can tell where and when it is going to be if it continues to follow that pattern?

Mr. SIMPSON. That is right.

Senator KERR. Has your department been doing any work, research, or investigation as to whether or not some action by man, such as the seeding of clouds or other action, would have a chance to dissolve or divert these storms?

Mr. SIMPSON. Our Bureau has studied the problem, is continuing to study it, and is following with interest the work outside the Bureau on this particular problem. Perhaps the best answer to your question is that in the research proposal which our Bureau has been developing, in consultation with the Air Force, the Navy, and other military establishments concerned, we have included one rather extensive project which would deal with the matter of modifying the activity of the hurricane insofar as this may be practicable.

I mean by that that we have included a section which is intended to explore as fully as possible what can be done in this regard.

Senator KERR. On the basis of the information and experience you now have and have had, is it your judgment that there is any real likelihood of that research, if stepped up and carried out, to result in a technique that would enable you to succeed in that effort?

Mr. SIMPSON. I have made quite a personal study of this problem myself and I am continuing it. In my individual opinion I think it is not impossible that something can be done ultimately to divert to a limited degree these storms. I must admit that we do not know how to do it at the moment but we recognize certain symptoms in these storms that potentially could be amenable to modification. We do not know whether it can be done. We are not sure how we would go about doing it. But we are looking carefully for the Achilles heel of these storms. There is a glimmer of hope.

Senator KERR. I am from Oklahoma. It has seemed to me that there has been a relationship between the average annual rainfall in our country and these gulf hurricanes that sweep in off of the Gulf of Mexico toward our part of the country. Do you have an opinion as to whether or not, if you did carry out that research and it would succeed, that it might affect the annual rainfall in areas of the United States, maybe considerable areas?

Mr. SIMPSON. I do not believe so. That is a personal opinion. However, I think the problem is so large that it would be difficult to say with assurance whether this would be the case or not.

Senator KERR. Is it possible that the carrying out of that research might develop information that would enable you to be effective or to develop an effective technique not only to succeed in being able to dissolve or divert or lessen the damage of these storms but also considerably improve the probability of increasing rainfall in areas now deficient?

Mr. SIMPSON. I would not want to be optimistic on that. I say there is a possibility, and certainly it has such vast potential and importance that we are eager to do everything we can to exhaust the possibilities in trying.

Senator KERR. Do you feel that if added appropriations are made that your department would have enough time to acquire and establish adequate facilities to not only make your service of information and warnings complete, but do you think there would be any possibility of success, in time, to materially affect what in all probability might be the next occurring hurricane in this area?

Mr. SIMPSON. Do you refer, Senator, to the work in the immediate improvement of the hurricane warning service, or to the basic studies?

Senator KERR. Both.

Mr. SIMPSON. Yes, sir.

In regard to the first portion of that, that is the improvement of the warning service in terms of what we now know about hurricanes, yes. We think that with a modest increase in appropriations to increase our staff and our facilities that we can deal, from an administrative point of view, if you please, more effectively with these storms.

I omitted one point in my first summary, which I would like to mention at this time, and that is the matter of communications, a very important point. Something must be done by our Bureau to allow us to get our information directly to the public earlier and more effectively and in a more timely manner than has been possible before.

Years ago, we depended almost entirely on telegraph messages. We had scores of messages to be sent out for each warning. When radio became a medium which could be depended upon to disseminate information effectively, we then began to lean more and more on radio stations. But even in many metropolitan centers where there are a dozen or more different radio stations, simply to sit down and call the warning message to be broadcast by each of those stations, at a time when these stations have their own telephone lines almost blocked by public calls, sometimes takes mor than an hour to accomplish.

This is a matter which is of very great concern to us and we feel that the only way the Weather Bureau will be able to get its product, directly to the people and in a timely manner once agreement is reached as to what is going to happen, is to have some direct means of broad-

casting this to the people. That means frequencies on a band which can probably be received conveniently and regularly by the public.

One of the big problems in Providence and elsewhere during Carol was simply getting the information out, once the warning was available. We had a lot of people to call. Of course it was early in the morning. The combination of all those factors made our warning, late as it was, much less effective than it would have been had we had some direct, forceful, and dependable means of reaching to the people.

If I could continue and comment on the last half of your question.

Senator KERR. Yes, sir.

Mr. SIMPSON. That is, can the Weather Bureau, within manpower and facilities available in the Bureau, conduct the basic research studies that are necesary. Our answer is that we feel that it is the Weather Bureau's statutory responsibility and duty to plan and direct such studies in cooperation with others who are in a position to contribute.

It would not be the Weather Bureau's plan to bring into the Bureau experts from all portions of the United States needed to complete the project, but rather to carry out only the core of this study, with the experts we already have on our staff, contracting out to universities, and to research organizations, those portions of the research which they are uniquely equipped to handle.

Senator KERR. In other words, it would be your suggestion that you direct the study but do so through other institutions or agencies now having the personnel, and thereby avoid your having to be in competition with them in securing personnel and setting up something that would be permanent just to take care of a problem that you feel would be temporary?

Mr. SIMPSON. That is correct. We do not believe it makes good sense to displace a lot of scientific personnel for one task. We would prefer to make use of the scientific research facilities which are available in various quarters, wherever we can.

Senator KERR. Has your department discussed with the Federal Communications Commission the problem you referred to here about being able to more rapidly and effectively disseminate this information?

Mr. SIMPSON. Not in recent months, sir.

Senator KERR. Do you think that might be indicated?

Mr. SIMPSON. Yes, sir.

Senator KERR. We want to thank you very much, Mr. Simpson, for appearing here and giving us these views and this information.

Are there any questions by members of the committee?

Senator GREEN. May I ask a question?

Senator KERR. Yes, sir.

Senator GREEN. Do you feel that you have been handicapped by the limitation on the amount of money available for you to use?

Mr. SIMPSON. The rising costs of our operation and other factors have made it necessary for us to cut back on the number of people we have had at first order stations in many places in the United States.

Senator GREEN. You have reduced the services, have you not?

Mr. SIMPSON. We have reduced our staff. We have not reduced our routine services, sir. We have reduced our staff to the point where we could do a routine job satisfactorily, but we are not always able

to satisfy peak loads. That has been the problem which we have faced.

Senator GREEN. Haven't you reduced the extent of your services?

Mr. SIMPSON. Literally I suppose we would have to say yes, Senator.

Senator GREEN. I am heartily in sympathy with giving you more money, but I do think it is difficult when you have limited your requests for funds beyond what you think you should have. Has not that been the case? Why not be frank about it? We want to give you more money. At least I do.

Mr. SIMPSON. We have asked for the funds which the Bureau has felt were appropriate for us to request to keep the best possible service in operation commensurate with the objectives which have been set us for the reduction of expenditures.

Senator KERR. Pardon me, Senator Green. Is the witness telling us that the amount of money you have requested has been determined not only by your own judgment as to what you needed, but also by suggestions made to you by the Office of the Director of the Budget?

Mr. SIMPSON. Not directly, sir.

Senator KERR. But effectively?

Mr. SIMPSON. Naturally the budget which any bureau provides is a product of teamwork. What we have requested has been the result of cooperative teamwork in Government in arriving at what has been agreed to be the best solution.

Senator GREEN. In other words, it has been intimated to you that you must not ask for more than a certain sum, to put it in plain English? Is that not right?

Mr. SIMPSON. I am not in a position to answer that, Senator.

Senator GREEN. Why not?

Mr. SIMPSON. I do not believe I have all the facts.

Senator GREEN. You won't contradict that statement?

Mr. SIMPSON. I do not know that it is true, sir.

Senator GREEN. But you are not prepared to say it is untrue, either. Is that right?

Mr. SIMPSON. That is right.

Senator SYMINGTON. Mr. Chairman, I have a question.

Was this cooperative teamwork the reason for the bad mistake that was made on Carol by the Weather Bureau?

Mr. SIMPSON. No, sir.

Senator SYMINGTON. What was the reason for that?

Mr. SIMPSON. The mistake, if mistake it was, on Carol, was the lack of understanding——

Senator SYMINGTON. Just a minute. You say "if mistake it was." We were told by the Weather Bureau that Carol was not going to come where I was in New England, and then it came there. Would you call that a mistake or not?

Mr. SIMPSON. I was not aware that the information went out that the storm definitely would not reach a specific place.

Senator SYMINGTON. Where it did. The information was that Carol was going to sea. As a result of that, when Carol came back into New England, that was the chief reason why the people were unprepared. I was just wondering if you had had more money could you have done better with respect to that particular problem?

Mr. SIMPSON. No, sir, I believe not. The answer is that we simply did not know enough about the basic structure and behavior of hurricanes to have made a better forecast than that.

Senator SYMINGTON. My next question. You talked about the telephones. The facts are, are they not, that every radio in every home, for hours on end, was being told about the progress of both Carol and Edna. I was not there during Hazel. Therefore, everybody in any community who wanted to listen to the radio—and most people have radios—knew exactly what the weather forecast was with respect to what those hurricanes were doing. Is not that true?

Mr. SIMPSON. They had the latest advice which had been called to the radio station. Sometimes there are delays. When enough information comes in and we issue a new press or radio bulletin, there are delays of appreciable lengths of time, an hour or 2 hours sometimes.

Senator SYMINGTON. In other words, your problem about communications was the inability to telephone the weather Bureau as to what was going on in your particular headquarters? Is that it?

Mr. SIMPSON. No. The inability of the Weather Bureau to advise the radio stations of the latest information.

Senator SYMINGTON. Where is the Weather Bureau in New Bedford?

Mr. SIMPSON. I am sorry, I do not have that information.

Senator SYMINGTON. You could walk right over New Bedford in an hour from one end to the other. You could hand the Carol message if necessary.

Mr. SIMPSON. Yes, sir.

Senator SYMINGTON. I am skeptical about the long delay. There did not seem to be any delay with respect to the knowledge on the part of the radio stations as to what the hurricanes were doing. I am just talking about the places where we were. We were pretty well isolated. Where there was trouble was that they received misinformation from the Weather Bureau.

You seem to be a little worried about some of the questions that Senator Green asked you about more money and your relationship with the Bureau of the Budget. I am wondering, can you give us better information about hurricanes in the future if you had more money?

Mr. SIMPSON. I think, Senator Symington, that if the Weather Bureau can carry out the basic studies which I have mentioned, we have every reason to believe more accurate information can be given on hurricanes. I will say that further if Carol occurred again, this year, under exactly the same circumstances, we would be in no better position scientifically to make a more accurate forecast of the movement of Carol, a more timely forecast, than we did the last one.

Senator PASTORE. Will you yield?

Senator SYMINGTON. Yes.

Senator PASTORE. Then the question that you answered to the subcommittee chairman that you expected to have this effective equipment all established in time for the next hurricane season was not exactly accurate, was it?

Mr. SIMPSON. Senator Pastore, I referred to forecasts, forecasts of the hurricane movement. I am speaking about the prognostication of the hurricane position, not the tracking of it.

We will be in a position to keep tabs on where the storm is from this hour to the next more effectively, but not to forecast changes in its movement.

Senator PASTORE. Do you mean to say that if you had had radar on Cape Hatteras, that you would not have been in a better position to have told us about Carol in 1954 than you actually were?

Mr. SIMPSON. Yes, sir, we would have been.

Senator PASTORE. That is precisely the point, is it not?

Senator SYMINGTON. That is what I was asking.

Mr. SIMPSON. It is a matter of semantics, I believe. When I said "forecasts" I meant the application of physical reasoning in forecasting changes in movement of the storm. The tracking of the storm we meteorologists think of as something separate.

Senator PASTORE. Do you feel, seriously, that if you get this added appropriation that you will have radar on Cape Hatteras before the middle of next August?

Mr. SIMPSON. Yes, sir. We have the radar all ready to install.

Senator PASTORE. I am glad to hear that.

Mr. SIMPSON. It will be in by the first of June.

Senator KERR. If you had an increase in your planes, for instance, you could certainly keep better track as to whether or not this hurricane was moving in the direction that had been indicated by the information that you had?

Mr. SIMPSON. The Air Weather Service and the Navy, sir, conduct a reconnaissance of hurricanes as you are aware, I am sure. They will have, I understand, even fuller facilities this next year than they have had in the past, to keep tabs on the storm, and they expect to maintain a 24-hour surveillance of all hurricanes which approach the coast.

Senator SYMINGTON. I have one more question, Mr. Chairman.

Senator KERR. Senator Symington.

Senator SYMINGTON. There is a lot of information, and possibly some misinformation, going around about the increased amount of radiation resulting from explosions of atomic weapons and nuclear weapons in this country and other countries. Has there been any study made as to whether there is any possibility that that is affecting storms? We know that the atmosphere stays relatively around the earth and that we pick up, the second time around, the same explosion particles.

Does that have anything to do, in the opinion of the Weather Bureau, with this problem?

Mr. SIMPSON. The Weather Bureau has not conducted studies of the effect of explosion particles upon the production of hurricanes. Nothing in the studies we have conducted or in other information available to us would indicate that radiation is making any difference.

Senator GREEN. May I ask one question?

Senator KERR. Senator Green.

Senator GREEN. You spoke about the request for additional funds. That has not yet been made, has it?

Mr. SIMPSON. Yes, sir; there is a request in our 1956 budget for additional establishment funds which will be used by the Weather Bureau during the next few years to improve its facilities.

Senator GREEN. Did you ask for what you thought you needed?

Mr. SIMPSON. Yes, sir.

Senator GREEN. Or for what you thought they would grant?

Mr. SIMPSON. We asked for what we thought we needed, sir.

Senator GREEN. I am glad to hear that. There is a difference, is there not?

Mr. SIMPSON. Yes, sir.

Senator SYMINGTON. Was that more than it was last year?

Mr. SIMPSON. This is a new fund; we are asking for a 4-year fund separate from our regular 1956 appropriation.

Senator SYMINGTON. How much was your regular 1955 appropriation?

Mr. SIMPSON. The 1955 appropriation was roughly $25 million.

Senator SYMINGTON. How much is in the separate fund in addition to the $25 million.

Mr. SIMPSON. $5 million.

Senator SYMINGTON. So this year you are asking for $30 million?

Mr. SIMPSON. I believe that there is a larger amount than that. I do not have the figure available to me.

Senator SYMINGTON. In other words, you are increasing the 25 in addition to the request for $5 million?

Mr. SIMPSON. We are increasing the $25 million in addition to the $5 million establishment fund.

Senator SYMINGTON. What did you ask the Bureau of the Budget for last year, before the storms came up? This time last year what was your request of the Bureau of the Budget?

Mr. SIMPSON. I am not familiar with the figures, sir.

Senator SYMINGTON. You do not know what the figures are for last year, but you do know what they are this year?

Mr. SIMPSON. I do not know what the regular appropriation is. I do know what the establishment is because I have had direct contact with that.

Senator SYMINGTON. Do you know what they were the year before last, what you asked for?

Mr. SIMPSON. No, sir; I do not have the information.

Senator SYMINGTON. Do you know if you received as much money as you asked for last year?

Mr. SIMPSON. I believe we received approximately what we asked for last year.

Senator SYMINGTON. Last year?

Mr. SIMPSON. Yes, sir.

Senator SYMINGTON. Would you submit for the committee what you asked for last year?

Mr. SIMPSON. I will get a statement on that.

Senator SYMINGTON. For the record. And what you were given. I am talking about your original request, prior to consultation with the Bureau of the Budget.

Senator KERR. You are talking about his request to the Bureau of the Budget?

Senator SYMINGTON. The original request. Not the request subsequent to the negotiation with the Bureau of the Budget.

Mr. SIMPSON. You would like me to furnish a statement to the subcommittee?

Senator SYMINGTON. That is right. For last year, what you originally requested of the Bureau of the Budget and the previous year,

the year before last, what you requested of the Bureau of Budget, broken down as you see fit, and what you actually received when the final decision was made.

Mr. SIMPSON. I will ask our budget officer.

Senator SYMINGTON. And if you could correlate that so it would reflect against the figures you have given us, which are $25 million, $25 million plus X, and then an additional $5 million which, as I understand it, you are obtaining as a result of the particular problem that we are discussing today. Is that correct?

Mr. SIMPSON. That is right, sir.

(The information requested is as follows:)

Weather Bureau appropriation requests to the Bureau of the Budget

Fiscal year—	Appropriation	Weather Bureau request	Bureau of Budget allowance
1954	Salaries and expenses	$27,435,000	$26,700,000
1955	do	25,500,000	24,750,000
	Supplemental	364,200	210,000
1956	Salaries and expenses	27,950,000	27,850,000
	Establishment of meteorological facilities	10,000,000	5,000,000

Senator KERR. Senator Bush?

Senator BUSH. I have no questions.

Senator KERR. Senator Cotton?

Senator COTTON. It may be a minor matter, but in the light of your whole testimony, sir, I am still a little puzzled about this matter of getting out the warning when you have reason to believe or become apprehensive that the hurricane is going to strike a certain point.

This matter of congestion of telephones I cannot quite comprehend. Even granting that the radio stations' lines are busy, even in the rather primitive state that I represent, one word to the head of the State police would go over two-way radio to every officer in every section of the State. One word to the Governor of the State or the Mayor of a city—and I cannot conceive but what that would be true in a metropolitan area like Providence or Massachusetts or Connecticut—I just cannot comprehend any real obstacle in this matter of getting out a warning because of the difficulty of telephones.

I am not being unduly critical, but to keep the record straight, would you amplify that a little bit?

Mr. SIMPSON. Yes; I would be glad to do that.

I did not mean to imply that this is a major problem everywhere. If there is 1 major radio station or 2, or even 3, the calling of a specific warning over the telephone to these stations is usually not a problem. But where there are 6 or 8 or 10 radio stations whose lines of course are frequently busy with calls from the public, sometimes it takes our employees quite a length of time to complete these calls to those who are kind enough to distribute the warning for us.

It poses a problem. I simply mentioned it as one of the things which the Weather Bureau is concerned about.

Senator COTTON. The facts are—and this is not in any criticism of you—the facts are that the failure to get warning in this instance, this last time, was because of the fact that you were utterly unable to

prognosticate which way it was going to jump. It was not because of delay in the facilities of the warning?

Mr. SIMPSON. That was the basic thing. I simply mentioned the communications problem as something which may have contributed, where an hour or even a half hour's additional time might have made a great deal of difference in the saving of some property.

Senator COTTON. Thank you, Mr. Chairman.

Senator BUSH (presiding). We did not get a record of your title in the Weather Bureau. Would you be kind enough to give your official title?

Mr. SIMPSON. I am special assistant to the assistant Chief of the Bureau for Technical Services.

Senator BUSH. Senator Thurmond?

Senator THURMOND. No questions.

Senator BUSH. Any other questions of Mr. Simpson? If not, we are very grateful to you for being here, Mr. Simpson. It has been very interesting and helpful to the committee to have you here.

Mr. SIMPSON. Thank you.

Senator BUSH. Mayor Walter H. Reynolds, of Providence.

STATEMENT OF WALTER H. REYNOLDS, MAYOR OF THE CITY OF PROVIDENCE, R. I.

Mr. REYNOLDS. I am Walter H. Reynolds, mayor of the city of Providence. Mr. Chairman and gentlemen, as mayor of the city of Providence it is my purpose to appear here today to urge speedy and favorable consideration of Senate bill S. 524, designed to provide a full and complete study of the problems of hurricane protection along the coast of the northeastern United States, and particularly with reference to upper Narragansett Bay.

On August 31, 1954, the city of Providence in common with the State of Rhode Island and other coastal areas of New England suffered the ravages of Hurricane Carol.

The damages due to this destructive hurricane were augmented tremendously within the city of Providence by tidal floodwaters accompanying the hurricane winds.

A large portion of the city's high-value downtown district was inundated to depths ranging up to 6 feet. Real estate suffered enormously, as did also merchandise stocks, business equipment and supplies, and other personal properties, some firms being forced to close as a result.

The degree to which the city of Providence suffered in this disaster is evidenced by the fact that of the total damages in Rhode Island as estimated by the Rhode Island Development Council at $64 million, more than 80 percent of this damage occurred within the city of Providence. The city itself, for the purpose of clearing highways, restoring city services and repairing public buildings, was forced to borrow approximately $1,400,000, which places a difficult burden upon the city's debt retirement program.

In the month following August 31, 1954, Hurricanes Edna and Hazel narrowly missed our coast. Had either of these struck full force and inflicted damages similar in proportion to those caused by Hurricane Carol, the results could have had a most serious effect upon business, upon industry and upon the tax base of our community.

The importance of the time element in the proposed study is of major concern to the city of Providence. It is my duty to the citizens of our city to urge with all possible earnestness that the Corps of Engineers be instructed to give study of local condition in and around Providence the highest possible priority in any study scheduled in order that no time may be lost in seeking adequate protection for this important business, industrial, and governmental center of Rhode Island.

I would also advise the committee that at least four private engineering firms have produced hurricane protection proposals calling for construction of dams or barriers at various locations. These proposals all appear to have some merit and are now being studied by the Providence Hurricane Protection Committee. If it is feasible and practicable for the Corps of Engineers to examine these proposals and endorse any one of them for Federal approval and possible Federal participation, it is possible that valuable time might be saved thereby and possible losses in the near future might thereby be averted.

There was a time when we thought of hurricanes as being a "once in a hundred years" occurrence. Experience and studies, particularly those by the Rhode Island Development Council, have shown that serious hurricanes occur along the New England coast on the average of one every 4½ years, and severe hurricanes occur on the average of once every 11 years. This constitutes a problem with which we cannot afford to gamble.

The aid proposed by Senate bill S. 524 is, therefore, essential to the city of Providence, and I earnestly solicit the assistance of this committee in recommending such aid be made available as rapidly as it is possible to do so.

Thank you, gentlemen, for the opportunity of expressing my opinion.

Senator BUSH. Thank you, Mayor Reyolds. The committee is very grateful to you for coming down here. Senator, do you have a question?

Senator GREEN. No questions.

Senator BUSH. Mayor Joseph Mills.

STATEMENT OF HON. JOSEPH MILLS, MAYOR OF THE CITY OF WARWICK, R. I.

Mr. MILLS. I am Mayor Joseph Mills, Warwick, R. I.

GENTLEMEN. The city of Warwick, R. I., urges that you give favorable consideration to a bill providing for a detailed study by the United States Army Engineers of the hurricane problems of the southern coast of New England and adjoining areas.

Warwick, like every other community, has its normal share of problems that are causing financial difficulties. In addition, like every other community badly hit by a hurricane, Warwick has the added problem of trying to work out the best way of living with hurricanes.

We in Warwick are not complaining about the hurricane problem even though Carol destroyed in Warwick 164 residences and severely damaged 146 others. We have come to realize that we are in a hurricane area and that we should take appropriate action. We know that the hurricane that hits us gives us problems that in great measure

we must solve ourselves, even though our problems must of necessity affect the State and Federal Government. The Federal Government, for example, has approved the reimbursement to Warwick alone of $109,000 spent in repairs to public facilities. Parenthetically, this money might not have been necessary had the proper hurricane protective work been in existence.

We are already taking steps on our own to work out our hurricane problems.

Our planning board has prepared a detailed report of hurricane damage and a report of possible hurricane-damage prevention measures. A copy of each of these reports is attached.

Our city council on April 21 will have before it for final reading amendments to our zoning and building ordinances establishing minimum building height and special building restrictions in zones of hurricane danger.

We are working with the Rhode Island Development Council and our general assembly to secure passage of a bill that will permit us to construct local hurricane protective works. Many groups of our shoreline residents have asked us to join with them in constructing necessary seawalls and other works to prevent further damage. This we want to do but under existing laws are unable to do so.

We are considering actively the solution to some of our hurricane problems of acquiring portions of the shores most exposed to hurricanes for public beach purposes.

Although we are going ahead with these and other courses of action, we recognize in so doing that we are acting in partial ignorance. We do not know what, if any, system of major hurricane protective works might be constructed in our area nor do we know what effect such a system might have on our hurricane problems.

There have been several proposals for various types of dams and breakwaters in Narragansett Bay. These structures have been proposed for several different locations. Obviously, those proposed for locations on the ocean side of Warwick are more attractive to us than those proposed for locations between Warwick and Providence but it is not my intention to argue in favor of one proposal rather than another.

Each of these proposals would have an effect, undetermined at present, on Warwick. In the absence of any comprehensive analysis of all proposals, we do not know what system of protective works is most logical for the entire area nor do we know what effect such a system, if built, would have on Warwick.

Given one major protective-work proposal in effect, perhaps our minimum first-floor building-height restrictions could be much lower. Given another proposal in effect, perhaps we should step up our efforts to acquire municipal beaches. These are examples of the questions that we are continually asking ourselves and being asked, questions we cannot answer.

We in Warwick submit that the proposed detailed study by the Army engineers of the hurricane problems of the southern coast of New England and adjoining areas is the most reasonable method of providing the comprehensive analysis of all hurricane major protective-work proposals necessary to permit local communities to take proper action or to revise action already taken concerning their own hurricane problems.

We in Warwick urge that favorable consideration be given a bill directing the Army engineers to give detailed study to the hurricane problems of the Northeast section of the United States.

Senator KERR. Thank you, sir. We are glad to have your statement.

(The document referred to above is as follows:)

WARWICK CITY PLANNING BOARD,
Warwick, R. I., September 16, 1954.

AUGUST 31, 1954, HURRICANE DAMAGE SURVEY

On August 31, 1954, Hurricane Carol struck, among other localities, Warwick, R. I., and caused extensive damage to structures, personal property, trees, shore, etc. In the days following the hurricane the director of planning in company with the building inspector conducted a preliminary survey of major damage to structures and the shoreline.

DAMAGE TOTALS

In Warwick Hurricane Carol demolished 131 residences and moved 34 a substantial distance from their foundations. As a result of the storm 33 residences on or near their foundations were condemned and major repairs were ordered for 112 other residences on or near their foundations. Eight commercial or industrial buildings were demolished; 3 other commercial or industrial buildings were condemned and major repairs ordered for 5 other commercial or industrial buildings.

Major portions of the coastline of Warwick were damaged extensively. Bluffs were cut back and portions of the shore were cut away in Potowomut, Chepiwanoxet, Buttonwoods, Warwick Neck, Conimicut, Gaspee Point, Gaspee Plateau, and Pawtuxet.

DAMAGE SUMMARY

Damage to structures is summarized in the accompanying tables "major damage to residences by area and plat" and "Major damage to commercial and industrial buildings by area and plat." Listings of major damage to individual structures are available for inspection in the office of the planning board.

Damage to shoreline is summarized as follows:

Potowomut.—The northeast coast of the Potowomut Peninsula was cut back approximately 50 feet from the Beachwood Drive pond to the end of Overlook Drive, approximately 2,000 feet. Private seawalls provided some protection to some lots.

Chepiwanoxet.—The Chepiwanoxet shore was cut back approximately 30 feet for a distance of approximately 500 feet centering on Harbor Lane.

Buttonwoods.—The shoreline at Buttonwoods was cut back about 30 feet from Nausauket to Andrew Comstock Road, approximately 2,500 feet. Along Promenade Avenue the shoreline was cut back approximately 50 to 80 feet, washing away timber bulkheads, banks, lawns, and in some areas major portions of Promenade Avenue. Portions of the groins of interlaced timber construction were torn away. Damage along Promenade Avenue frontage extended from Andrew Comstock Road to the tip of Buttonwoods Peninsula, approximately 4,000 feet.

Warwick Neck.—The Warwick Neck bluff was cut back approximately 50 feet in the vicinity of the lighthouse.

Conimicut.—The high bank on the north shore of Conimicut was cut back approximately 50 feet for about 4,500 feet from Symonds Avenue to Rock Avenue. In this area privately constructed sea walls parallel with the water's edge were in some cases demolished and in other cases remained standing and apparently provided some protection from erosion. Erosion was not uniform in the area.

Gaspee Point.—The shoreline at Gaspee Point was cut back approximately from 20 to 150 feet for a distance of about 3,000 feet south from Gaspee Point.

Gaspee Plateau and Pawtuxet.—Isolated and exposed yards in the Gaspee Plateau and Pawtuxet areas were cut back in varying amounts.

CAUSES OF DAMAGE

Three principal causes of damage to construction and the shoreline were apparent.

Some small structures of poor quality construction were damaged by the outright force of hurricane winds. Some buildings were actually lifted from their foundations before the hurricane waters inundated the area. Damage caused by winds was of a minor degree and in almost every case became unnoticeable when submerged in the greater amount of damage caused by hurricane waters. The second principal cause of damage was the actual flooding of low-lying areas by hurricane waves. Low-lying areas were flooded to a depth of 13 feet, the waves sweeping buildings from their foundations and causing extensive destruction. The measurement of height of flooding was made by Warwick Department of Public Works engineers.

The third principal cause of damage was the hurricane waves striking with eroding force against the shoreline, to be differentiated from the hurricane waves washing over the low-lying shores, the second cause of damage.

LIMITATIONS OF SURVEY

The main foci of the hurricane damage survey were the demolished or badly damaged principal structures and the determination of which structures should be razed or repaired. Minor damage to structures was not measured.

A building was counted as destroyed if it had been demolished or moved off its foundations and out of its lot. Since many residences were washed several blocks away from original sites and since it was impossible to determine by inspection of a foundation whether the building was demolished or only swept away it was impractical to attempt to relate the structures remaining in existence to the appropriate lot or foundation.

The numbers of condemnation and major repair orders for residences issued by the building inspector, 45 and 134, respectively, are greater than the number of buildings shown by the planning board's survey as requiring razing or major repair, 33 and 112, respectively. The building inspector condemned or ordered repairs to every building in the hurricane disaster areas in need of such action, regardless of actual location. The planning board's listing of condemned buildings or buildings in need of major repairs is limited to those on or near their foundations. The buildings listed by the building inspector but not by the planning board as condemned or in need of major repairs are those swept a substantial distance from their foundations.

The preliminary survey of damage to shorelines indicates only the general areas and description of destruction. It does not include a detailed investigation of shore protective works or specific measurement of damage.

Major damage to residences by area and plat, Aug. 31, 1954, hurricane

Area and plat	Destroyed (demolished [1] or swept away [2])	Condemned [3]	Major repairs needed [3]
Potowomut (201, 202, 203)	11		12
East Greenwich and Chepiwanoxet (220, 221)			2
Arnold's Neck (365)	2		
Cedar Tree Point and Nausauket (367)	2	1	2
Buttonwoods (369)	1	1	
Oakland Beach (360, 375, 376)	46	18	39
Warwick Cove (359, 358, 377, 378)	10	7	14
Rocky Point (380)			3
Highland Beach and Longmeadow (356, 355, 335)	26	2	6
Conimicut (336, 334, 333, 317, 315)	67	4	26
Gaspee Point (316)			1
Gaspee Plateau and Pawtuxet (304, 292)			7
Total	165	33	112

[1] Demolished, 131.
[2] Swept away, 34. In existence but either condemned or need major repairs; not included in totals of residences on or near foundations condemned or in need of major repairs.
[3] Remaining or or near foundations.

Source: Planning board survey, Sept. 1–15, 1954.

Major damage to commercial and industrial buildings by area and plat, Aug. 31, 1954, hurricane

Area and plat	Destroyed	Condemned	Major repairs needed
East Greenwich and Chepiwanoxet (220, 221)	[1] 1	[2] 2	[3] 1
Apponaug (365)	[4] 1		
Oakland Beach (375, 376)	[4] [5] 4		[4] 2
Warwick Cove (378)	[4] 1		
Rocky Point (380)		[6] 1	[7] 2
Longmeadow (355)	[4] 1		
Total	8	3	5

[1] Major building in Greenwich Bay boat yard.
[2] Main building and boiler plat at Gaco Corp. building.
[3] Main building of old aircraft factory.
[4] Boat, bait, and fish houses.
[5] Yacht club.
[6] Rocky Point Shore Dinner Hall.
[7] Rocky Point Bathing Pavilion.
[7] Rocky Point Palladium.

Source: Planning board survey, Sept. 1–15, 1954.

WARWICK CITY PLANNING BOARD,
Warwick, R. I., February 14, 1955.

The HONORABLE MAYOR AND CITY COUNCIL OF WARWICK,
City Hall, Warwick, R. I.

GENTLEMEN: In accordance with Warwick City Council Resolutions Nos. 2880, 2881, and 2882, of October 21, 1954, the Warwick City Planning Board submits herewith a report on proposed measures for the future development of areas in Warwick repeatedly damaged by hurricanes.

The advice of staff members of the Rhode Island Development Council in the preparation of this report is gratefully acknowledged.

Respectfully,

NATHAN M. SOUTHWICK, Jr., *Chairman.*

SUMMARY OF RECOMMENDATIONS

1. That decisions concerning construction of actual local hurricane-protective works be postponed until it is known which of several bay-barrier proposals will be constructed.
2. That Warwick enact immediately an amendment to its zoning ordinance that would establish a minimum elevation of 15 feet above mean sea level for the first floor or for cellar-wall openings, if provided, of any new principal building in the areas of hurricane danger.
3. That detailed study be given to the filling of low-lying areas of hurricane danger to make them more easily usable for building purposes and to the financing of such filling by benefit assessment.
4. That detailed study be given to the construction of protective works along hurricane eroded shores and to the financing of such construction by benefit assessment.
5. That consideration be given the acquisition and development of the beach frontages of Oakland Beach and the south shore of Conimicut Point, such development to include provision of natural slopes to a height of 15 feet above mean sea level to provide protection to residential areas in back of the beaches from the battering impact of hurricane waves.
6. That Warwick proceed with urban-renewal planning to determine, among other things, the potentialities of Federal urban-renewal funds for the construction of works necessary for the protection of residential areas.

NARRAGANSETT BAY BREAKWATER PROPOSAL

Two Warwick engineers have recommended that a system of breakwaters be built near the lower end of Narragansett Bay to reduce greatly the potential damage from hurricanes in almost the entire bay. This proposal has been

recommended to the United States Army Corps of Engineers by the Rhode Island Development Council as one of the principal barrier proposals to be studied by the engineers.

Should the Narragansett Bay breakwaters, or any similar system of protective structures, be built, the damaging effect of hurricanes on Warwick and all other communities north of the structures would probably be greatly reduced.

Consequently, it is recommended that decisions concerning actual construction of local hurricane-protective measures suggested in this report be postponed until it is known which of the several proposed bay barrier proposals will actually be built.

In the interim, however, provisions for safety to life and property should be built into any building that may be erected prior to a decision concerning a bay-barrier proposal.

Consequently, it is recommended that Warwick proceed immediately with the enactment of an amendment to its zoning ordinance that would establish a minimum elevation above sea level for buildings erected in areas of hurricane danger as suggested below in this report.

HURRICANE DAMAGE CAUSES AND GENERALIZED PREVENTIVE MEASURES

The hurricane damage to Warwick had three principal causes: The high winds, the high tides flooding low-lying areas, and the powerful waves battering against the shoreline.

Damage caused by high winds can only be prevented or reduced through the application of sound building practices. Such building practices are contained in the present building code of Warwick.

Damage from high hurricane tides has been extensive in Warwick. The tides, up to 15 feet above mean sea level in height, have flooded great areas of low-lying lands along the bay shores and up the coves of Warwick. The areas of flooding have been far too great to permit any local protective works such as dikes or dams. Damage from flooding can be prevented or reduced, however, by filling low-lying areas to an elevation above hurricane tide heights, by constructing new buildings to a similar elevation, or by some combination of these two methods.

Damage from the impact of hurricane waves occurred on the shores exposed to the force and fury of the hurricane winds. Bluffs and high banks are often very vulnerable to smashing hurricane waves. Damage from wave action can be prevented by the construction of appropriate structures such as groins, seawalls, dunes, riprapped banks, etc. The cost of such structure is often great and must be justified by the amount of benefit to be received from the particular structure.

BASIC REQUIREMENTS

In studying the several possibilities for reducing the damaging impact of hurricanes on Warwick, the planning board has held that any recommendation should satisfy four basic requirements.

1. Provisions should be built in for the safeguarding of life.
2. Provision for the safeguarding of property should be as complete as possible.
3. Any areas acquired by the city should be used by the city for some public use.
4. Every effort should be made to maintain and rebuild the residential character of areas that are primarily residential neighborhoods.

REBUILDING SHOULD BE ENCOURAGED

The portions of Warwick near the water have been and can be very desirable residential locations if they can be made safe places to live in. The low-lying areas, however, need protection from flooding damage. If no action to prevent flooding damage is taken, and rebuilding takes place without proper safeguards, the next Carol will see a repetition of disaster.

If every new building were to be built above the height of hurricane tides, damage from flooding would be greatly reduced. Building above hurricane tide height can be provided for by filling all low-lying areas, by a zoning amendment requiring all new buildings to be constructed above hurricane tide height, or some combination of these two methods.

Hurricane Carol's tides in the Oakland Beach area reached a height of 13.60 feet above mean sea level and on Conimicut Point 14.40 feet. This is a height

up to 10 feet above ground level, depending, of course, on the elevation of the ground. Near the southern end of Overton Street the elevation of the tide above ground was about 8 feet, at the intersection of Hewett Street and Sea View Drive about 7 feet, and at the cove end of Strand Avenue about 10 feet.

Neither the 1938 hurricane or Carol were quite of the maximum intensity possible, although each were nearly as strong hurricanes as Warwick is likely to experience. Consequently, hurricane tides somewhat higher than have occurred should be provided for.

Breakwaters or other protective structure in Narragansett Bay south of Warwick in all probability would greatly reduce the height of hurricane tides in Warwick. However, such protective structures are not now in existence and, if it is agreed by the appropriate authorities that they should be built (at this writing, such agreement is not certain), their construction will require a certain period of time, time in which additional hurricanes may occur.

Until protective structures are built in the bay south of Warwick, new buildings in low-lying areas subject to hurricane flooding in Warwick should be built with first floor or cellar wall opening elevations above the height to which hurricane tides may well rise. Fifteen feet above mean sea level—from zero to 10 feet above ground level—is probably a minimum estimate of that height. Construction at that level would greatly reduce damage to property from hurricanes and, much more important, add tremendously to the safeguarding of life.

Consequently, it is recommended that the zoning ordinance of the city of Warwick be amended to require that all new buildings in low-lying areas subject to hurricane flooding have the first floor or cellar-wall openings, if provided, built at an elevation of 15 feet above mean sea level and be securely fastened to strong foundations or piers. A draft of a suggested ordinance is attached.

Should a breakwater be built which would reduce the probable height of hurricane tides, the required building elevation should be reduced in proportion.

Many portions of Oakland Beach and Conimicut Point that were flooded have a ground elevation of about 6 feet. In such areas, the first floor of a new building would be about 9 feet above ground level. If its building lot were filled 5 feet, the first floor would be only 4 feet above ground.

AREA FILLING POSSIBILITIES

Some portions of the areas subject to hurricane flooding are, of course, higher than others. In these, a building built to conform with the recommended first floor elevation requirement will be easier to design to have a satisfactory appearance than in the lower areas. If all of the low-lying areas could have a ground elevation of approximately 10 feet above mean sea level, the 15-foot requirement would be fairly easy to satisfy with a building safe from hurricane danger and at the same time of satisfactory appearance. With such a ground elevation, the material excavated from a cellar hole could be used to grade up the lot to a somewhat higher ground elevation, lessening even more the distance between ground and required elevation that should be taken into account when designing the exterior appearance of the house and its site.

Filling all the low-lying areas to a satisfactory height is far too big a job for property owners acting individually to undertake. However, with all the property owners acting together and with the city's participation it may be possible to conduct a filling operation that will make it possible to build a safe building at a reasonable height above grade.

Filling large areas to be used for residential development, a private rather than public development, might be financed by the benefit-assessment method. In a benefit-assessment program, after petition by the affected property owners, the city does the actual work and then assesses the cost of the work on the benefited properties. In such a program the city would bear the cost of filling city properties, streets in particular.

For example, if the area on Conimicut Point generally east of Spadina Avenue and south of Point Avenue were raised 5 feet with fill costing $0.90 per cubic yard, the cost per 5,000-square-foot lot would be about $850. If lower fill costs could be achieved through use of a sandsucker dredge, the cost per lot, of course, would be proportionately reduced. The area used in the present example is illustrative only and is not a suggestion of which area might or might not be filled.

Consequently, it is recommended that the city give detailed study to the possibility of using the benefit-assessment method for the filling of low-lying areas to a height easily usable for building purposes.

The planning board earlier forwarded to the Rhode Island Development Council a draft of the suggested content of provisions of enabling legislation that would permit Rhode Island municipalities to undertake the repair or prevention of hurricane damage to private properties on a benefit-assessment basis. The board hopes that such provisions will be incorporated by the development council in the hurricane rehabilitation bill now in preparation.

REBUILDING OF HURRICANE ERODED SHORELINES

Oakland Beach and Conimicut Point were not the only areas of Warwick that were badly damaged by Carol. Great stretches of Warwick's shoreline—Warwick Downs, Gaspee Point, Conimicut, Shawomet, Warwick Neck, Buttonwoods, Chepiwanoxet, Potowomut—were badly eroded by the hurricane. Some houses on these shores were toppled onto the beach, others were damaged or imperiled.

Erosion on these shores is not liimted to that caused by the dramatic hurricanes. The customary storms that occur every year are also extremely damaging in eroding away the banks.

These stretches of shoreline are almost completely in private ownership and, being almost completely built up with residence, are an important part of the city's tax base. Because these shorelines are in private ownership, the city at present cannot construct protective works such as seawalls or groins along them to hold or rebuild the shore.

Should the city be able to use the benefit-assessment method, it would be possible for the city to construct the required protective works in front of private properties, given approval by the property owners, and assess the costs on the benefited properties.

The type of required protective works vary with different types of shoreline. Seawalls, breakwaters, riprap on banks, groins, are each useful in particular situations. The exact type needed and cost for an area can only be determined after a careful engineering analysis of the appropriate location.

Consequently, it is recommended that after passage of legislation permitting a Rhode Island city to construct protective works on a benefit-assessment basis, the city begin discussions with appropriate groups of shore and adjacent property owners concerning first, the planning and, second, the construction of necessary protective works.

BEACH RECREATION POTENTIALITIES

To provide salt-water swimming for 51,000 people, Warwick, a city with approximately 39 miles of coastline, has at present about 600 feet of public beach that has any associated parking area.

The National Recreation Association recommends that 1 foot of beach per person be provided for between 3 and 5 percent of the city's population. To meet this standard, Warwick should have between 1,500 and 2,500 feet of beach now and between 3,300 and 5,500 feet when Warwick grows to its potential population of around 110,000. Warwick's fresh-water ponds can satisfy only a small portion of the needed amount of beach area.

Salt-water beaches in Warwick will never compete in popularity with the surf beaches of South County. Rather, beaches in Warwick will have their own specialized function: to provide beach facilities for the casual, informal, limited time beach excursions, for the mothers taking children to the beach for a summer morning, for the father taking the family to the beach after work and before a late supper, for the aftersupper beach trip, and for similar uses of a neighborhood or community beach.

Salt-water beaches in Warwick should be located in several sections of the city to provide ready beach access for as many people as possible. All the beaches should not be concentrated in one area.

A fine beginning has been made in the development of a public beach in Oakland Beach. The groins and riprap installed just before Carol withstood the storm superbly. Sand is being caught by the groins and the beach area is being built up.

Hurricane Carol devastated the forontages of both Oakland Beach and Conimicut Point, the areas that received the initial and strongest impact of the hurricane waves crashing against the shore. Danger to life is inherent in these areas, danger which can best be eliminated by the construction of a 15- to 20-foot-high

powerful seawall or the development of a beach that will absorb and mitigate the force and fury of the hurricane waves.

Consequently, it is recommended that the city consider the acquisition and development of the beach frontage in Oakland Beach from the mouth of Brush Neck Cove to the mouth of Warwick Cove and on the south shore of Conimicut Point from the point west to the mouth of Mill Cove. The total length of these 5 beaches, including the length of existing beaches, is approximately 5,800 feet, only about 300 feet more than would be suggested by a rigid application of the beach area standard.

The development of both the Oakland Beach and Conimicut beaches would probably necessitate the construction of groins as in the present Oakland Beach development to prevent the littoral movements of sand and to build up the beaches.

Development of the beaches might well be scheduled in stages as the population of the city increases.

In addition to providing for the building up of the beaches themselves, the development of the beach areas should provide built-in protection for the residential areas in back of the beaches. All of the new houses in these areas should be built above hurricane flood levels—but such construction will, of course, not prevent the hurricane waves from battering at the shores and consequent damage to the areas behind the beaches.

The best method for preventing damage from strong storm waves pounding on the shores is to emulate nature, to not try to prevent the waves from coming ashore but to let the waves expend their force harmlessly by riding up a gradual slope. A natural beach slope or dune is the most efficient method for eliminating the tremendous damage potential of hurricane waves smashing at the shores.

A natural beach slope could and should be used as part of the actual beach development itself. A slope might well consist of sand beach beginning at any necessary riprap near the normal high-tide mark and extending back from 100 to 150 feet, a turfed and tree planted area also about 100 to 150 feet wide, which would be used for family picnics at the beach and informal games, and a paved road and parking area about 60 feet wide at the top of the slope, the entire slope rising from the elevation of normal high tide to an elevation of about 15 feet above mean sea level. The inland side of the slope could fall as rapidly as feasible to ground elevation which after a fill operation might be at an elevation of from 5 to 10 feet above sea level.

Such a slope would have two functions, to provide space for beach uses and at the same time to provide protection from the battering waves for the inland residential areas. By itself, such a slope would not prevent inland areas from being flooded. Flooding prevention can only be accomplished by filling as discussed in the section entitled "Area Filling Possibilities."

Fill material for use in building such a slope might well be dredged from adjacent waters, possibly resulting in lower unit costs than if the fill were trucked in. In the case of Oakland Beach, dredging the material from adjacent waters would result in the deepening of Warwick Cove and the elimination of the sand bar at the mouth of the cove.

The State government has signified its intention of helping municipalities in the acquisition of hurricane-endangered lands for suitable public purposes. The acquisition of the Oakland Beach and Conimicut Point frontages for public beaches certainly qualifies for such aid. Accordingly, Warwick should count on State aid for the acquisition of its hurricane-battered shores for beach purposes.

At this writing the State has not indicated its thinking concerning a formula for sharing the cost of beach acquisition. The development council in its interim report on hurricane rehabilitation has indicated that any such State aid will probably be contingent upon a municipality's enacting appropriate zoning or building-code provisions to minimize the damaging effect of future hurricanes.

In making a recommendation for the development of beach frontages, the planning board realizes that the recommendation will place the city in a dilemma. On one hand, the beaches are needed and will be still more needed as the city's population continues to increase. On the other hand, beach acquisition will require city moneys, even with State financial participation. The board realizes the city is faced with the necessity for continuing expenditures for other public improvements, schools in particular, and that there is no easy solution for the problem of raising the money that would be needed for all desirable projects.

ADDITIONAL FINANCING POSSIBILITIES

The construction of public beach protective works, groins, riprap, and beach slope, the raising of large areas with fill, the construction of protective works to prevent further erosion of shores, all will require money. The use of benefit assessments and of State aid have been discussed in appropriate contexts. These are two methods of spreading the financial burden.

The third method, a third source of financial aid, may be available in Federal housing area rehabilitation funds. In the Federal urban renewal program as established in the Housing Act of 1954, the Federal Government has demonstrated its wish that urban residential neighborhoods be maintained as good, safe, and healthy places in which to live by stating that it will bear two-thirds of the cost of any necessary rebuilding of older residential neighborhoods. Federal moneys are available for the purpose. Included in the rebuilding of older residential neighborhoods can be the provision of necessary public facilities such as streets, utilities, schools, the improvement of the land itself to make it safe and healthy for building purposes, as well as any necessary improvement of housing conditions themselves.

An urban renewal program requires detailed planning, detailed analyses of housing conditions, detailed engineering plans of proposed public works, and careful coordination of planning with local neighborhood objectives. Because of the time and expense involved in detailed planning, the Federal Government will advance urban renewal planning funds to any community that will demostrate its genuine interest in maintaining and improving the quality of its residential areas. The advance planning funds become part of the total cost of an urban renewal project, two-thirds of which is borne by the Federal Government. Should a municipality after carrying out its advance planning decide that a project is not necessary, the planing funds need not be repaid.

Consequently, it is recommended that Warwick take the necessary steps to proceed with urban renewal planning in order to determine, among other things, whether or not the urban renewal program offers part of the financial solution for the construction of works necessary for the protection of residential areas.

AN ORDINANCE AMENDING THE ZONING ORDINANCE OF THE CITY OF WARWICK

It is ordained by the City Council of the City of Warwick as follows:

Section I

The following sections of that ordinance passed by the City Council of the City of Warwick on June 21, 1945, as amended, and entitled "Zoning Ordinance of the City of Warwick," are amended to read as follows:

Section I: Purpose.—For the purpose of promoting the public health, safety, morals, general welfare, and to secure safety from the danger of hurricanes, and acting under authority of chapter 342, General Laws of Rhode Island, and all amendments and additions thereto, the City Council of Warwick hereby enacts this zoning ordinance to regulate and restrict the height, number of stories and size of buildings and other structures, the percentage of the lot that may be occupied, the size of yards, courts, and other open spaces, the density of population and the location and use of buildings, structures and land for trade, industry, residence and other purposes.

Section II.—The herein zoning regulations and the districts set forth are approved and established. The zoning map bearing the signature of the city engineer and dated June 21, 1945, assessors' plats entitled "Areas of Hurricane Danger" bearing the signature of the chairman of the Planning Board of the City of Warwick and dated February 17, 1955, which are on file with the city clerk and the record book of lot classifications as amended which accompany this ordinance are hereby declared to be a part hereof. No building or land shall be used and no building shall be erected or structurally altered except in conformity with the regulations herein prescribed.

Section III: District.—For the purpose of this ordinance, the City of Warwick is hereby divided into 9 classes of districts, designated as follows:

1. Residence AA districts.
2. Residence A districts.
3. Residence B districts.
4. Residence C districts.
5. Business D–1 districts.

6. Business D–2 districts.
7. Business D–3 districts.
8. Industrial E districts.
9. Areas of Hurricane Danger.

The permitted uses in any part of any zone which is also within an area of hurrncane danger are subject to the following conditions:

(*a*) The first floor of any building other than an accessory building shall have a minimum elevation above mean sea level of 15 feet.

Section XIII: Nonconformity Uses.—Subsection F is added to section XIII as follows:

F. All uses which are made nonconforming by the regulations pertaining to the areas of hurricane danger may be continued and maintained and the following special provisions shall apply:

1. Principal buildings removed from foundations but ot demolished by hurricane Carol of 1954 may be replaced at or near their original location and elevation provided they are placed on foundations in a manner in conformity with the provisions of section 19A through F (foundations of the building ordinance of the city of Warwick.

2. Principal buildings demolished by hurricane Carol and principal buildings demolished or removed from foundations by any succeeding hurricane, if rebuilt, shall be rebuilt in accordance with the provisions of this ordinance concerning areas of hurricane danger.

Section XIV: Enforcement.—This ordinance shall be enforced by the inspector of buildings acting in the name of and on behalf of the city of Warwick. No building shall hereafter be erected or structurally altered until a permit authorizing the same shall be issued by the inspector of buildings. The application for a permit for any building to be erected in an area of hurricane danger shall state the elevation above mean sea level of the finished grade at the corners of the building or buildings to be erected thereon and shall contain the stamp of a registered engineer or land surveyor.

Section XIX: Definitions.—Subsection 26 is added to section XIX as follows:

26. The first floor of any building is its lowest floor that is designed for the principal use of the building.

Section II

This ordinance shall take effect upon its passage and all ordinances or parts of ordinances inconsistent herewith are hereby repealed.

AN ORDINANCE AMENDING THE BUILDING ORDINANCE OF THE CITY OF WARWICK

It is ordained by the City Council of the City of Warwick as follows:

Section I

That ordinance passed by the City Council of the City of Warwick on April 18, 1946, as amended, and entitled "Building Ordinance of the City of Warwick" is amended as follows:

Section I.—Paragraph (f) is added to section 19 (Foundations) as follows:

(*f*) In areas of hurricane danger as established by the zoning ordinance of the city of Warwick the following provisions concerning foundations shall apply:

1. All buildings, except accessory building of under 100 square feet in floor space, shall have foundations of poured continuous concrete or solid pier foundations extending from the sill to a depth of not less than 4 feet below the surface of the finished grade where the foundation or pier is built.

2. All concrete foundations shall be poured between forms.

3. The wall sills of all buildings hereafter erected, except accessory buildings of under 100 square feet in floor area, shall be anchored to their foundations walls or piers at corners and at intermediate intervals of not more than 8 feet by three-quarter inch bolts with 12 inches of their length embedded in the foundation and having a right angle bend within the foundation.

4. The highest plates of each building hereafter erected, except accessory buildings of under 100 square feet in floor area, shall be tied to the foundations by two tie rods or similar fastening at each corner.

Section II.—Paragraph (h) is added to section 56 (wood connstruction) as follows:

(*h*) Sheathing of all buildings in areas of hurricane danger as established by the zoning ordinance of the city of Warwick, except of accessory buildings of under 100 square feet in floor area, shall be diagonally boarded at every corner for a distance along the wall equivalent to the height of the highest joists above the sill.

Section III.—Lots within areas of hurricane danger that have a finished grade of over 15 feet elevation above mean sea level are exempted from the provisions of this amendment to the building ordinance.

Section IV.—This ordinance shall take effect upon its passage and all ordinances or parts of ordinances inconsistent herewith are hereby repealed.

WARWICK INDUSTRIAL COMMISSION,
Warwick, R. I., April 18, 1955.

Re S. 524 introduced by Senator Theodore Francis Green (for himself and Senator John O. Pastore)

Senator THEODORE FRANCIS GREEN.
Senator JOHN O. PASTORE.

HONORABLE SIRS: I wish to present my full support to bill S. 524 for investigation of damage to Narragansett Bay and southern New England shores and to offer my cooperation and assistance in any way possible with plans for effective protection against tidal flood damage.

In investigating the extent of our damage I hope that the Corps of Engineers will seriously consider not only all of the damages as valued in dollars, but also the incalculable threat to human life, health, homes, and the productivity of the entire area.

Water damage is preventable and it can be accomplished by a master plan integrated with broad national interest. Many plans have been suggested, and I believe that the Corps of Engineers should seriously consider them all. Also, I hope that they will consider the plan in which I am vitally interested; namely, the complete protection of Narragansett Bay by construction of breakwater dikes at the east and west passages of the bay.

I know that the Corps of Engineers has the technical knowledge, ability and manpower to perform this task. I know they have the facilities to study the effectiveness of such a scheme by model basin testing techniques. I know there is a vast fund of information and resources available to the Corps of Engineers which would enable them to formulate and execute a master plan.

It is of paramount interest to all of us that this bill be passed as soon as possible and money be appropriated for this work.

Respectfully,

E. T. DAHL.

Senator KERR. We will now hear John Clemens.

STATEMENT OF JOHN A. CLEMENS, VICE PRESIDENT, THE GREATER PROVIDENCE CHAMBER OF COMMERCE, PROVIDENCE, R. I.

Mr. CLEMENS. Mr. Chairman and gentlemen of the committee, my name is John A. Clemens. I am a vice president of the Greater Providence Chamber of Commerce. I am also a vice president of the Davol Rubber Co., 69 Point Street, Providence, R. I.

The Greater Providence Chamber of Commerce has upwards of 1,600 members; a very large number conduct business in the so-called hurricane section of the city of Providence.

Those members recognize that Providence is no better off as regards hurricane protection than the ocean front of Rhode Island, and that it faces gradual liquidation and dissipation of its resources unless some definite action is taken promptly. The one and only issue—will help come in time?

The area includes in addition to Federal, State and municipal properties: the principal electric and gas powerplants in the State, trans-

portation facilities, the financial district, including most major offices of banking and insurance in the State of Rhode Island, principal hotels, the entire wholesale district, department stores and miscellaneous accompanying enterprises of all kinds, and in addition a considerable number of the larger manufacturing plants which had flood losses to plant, equipment and materials, as follows:

Narragansett Electric Co., upward of $2 million.
United States Rubber Co., $1 million.
Wiring Device Division, General Electric Co. $700,000.
Brown & Sharpe Manufacturing Co. $250,000.
Nicholson File Co., $135,000.
B. I. F. Industries, $100,000.

In the case of my own company, the Davol Rubber Co., the direct loss was $550,000, plus loss of pay by employees due to 3 weeks of work stoppage; plus loss of 150 private cars, appraised at $200,000; plus $25,000 spent preparing for Edna when we got the announcement that another hurricane was on the way.

I am attaching, gentlemen, at the back of my report, a picture of the Point Street Bridge. As you look at that picture, that picture was taken from a window at the back of our plant. That picture shows a tugboat at the end of the bridge and directly facing our plant. We did not know if the water raised a little more but that that tugboat would have come over and hit us broadside in the front.

Those little dots that you see on the picture are the tops of automobiles in our parking lot.

While exact figures are not available on loss of wages, the Rhode Island Department of Employment Security, in its annual report states, with respect to Carol:

> It brought practically all business and industrial activity in the State to a standstill for a time. More than 100,000 workers were idled in all lines of work for periods ranging up to 4 weeks, and the combined cost to the Rhode Island economy in property damage and lost wages has been calculated at some $200 million.

The hurricane report of the New England-New York Interagency Committee indicates that damages to industrial plants and equipment exceeded $10 million from Hurricane Carol. Immediately after Hurricane Carol, the Small Business Administration sought quarters in this area to render assistance and the Greater Providence Chamber of Commerce placed their facilities at their disposal, resulting in the processing of several hundred claims and assistance to small businesses to the extent of $2 million. Because of this many have been able to survive and, therefore, have avoided bankruptcy.

The latest conservative estimate of overall flood loss in the area is placed at approximately $52 million. This does not take into account intangibles which cannot be estimated but can be conservatively fixed at many millions additional. Our members feel that there are available competent engineers, necessary labor and suitable material. All we lack is financial support and the necessary authority to act.

Will the Federal taxes paid over the years in support of emergency relief elsewhere redound to our own relief in our time of need?

Unfortunately there is no safe time allowance. Catastrophe may strike again within a few months, or by the grace of God we may be allowed a year or so to prepare our defense. No individual com-

pany or group of companies can cope with the situation—individual protection, if at all feasible, does not protect property value unless overall protection is made available. According to the best engineering advice such protection is feasible.

We are not seeking protection for ourselves to the exclusion of necessary protection elsewhere; but, in view of the studies showing, beyond a shadow of a doubt, much the greater concentration of property loss occurred in Providence than elsewhere, are we not justified in asking priority of action to the end that further overwhelming loss will be avoided?

Some businesses have already moved to new locations, others are preparing to move and still others are quietly making plans. All this does not make for a healthy environment and can be avoided by prompt action.

We, therefore, urge favorable action on this proposed legislation so that the Army engineers may immediately proceed to survey the situation and prepare their recommendations for a necessary construction in time to prevent further such catastrophies as we suffered in 1938 and 1954.

Thank you for the opportunity of appearing before you.

Senator KERR. I have one question, Mr. Clemens.

On page 1 of your statement you say:

> Those members recognize that Providence is no better off as regards hurricane protection than the ocean front of Rhode Island, and that it faces gradual liquidation and dissipation of its resources unless some definite action is taken promptly.

I interpret that to mean that you are telling this committee that if this problem is not solved that it will result in irreparable loss, damage, and destruction to your community?

Mr. CLEMENS. That is right. I might say, gentlemen, in that regard, that there is hardly a day goes by but that in our discussions at my shop elements of further outlay that we consider are judged in the light of whether we will get protection or not, or whether we should move elsewhere.

Senator KERR. Thank you, Mr. Clemens for your able statement.

Mr. CLEMENS. I have brought with me, Mr. Chairman, some hurricane books which I would like to enter, if I may.

Senator KERR. Senator Symington has a statement from Senator Kennedy to read into the record at this time.

Senator SYMINGTON. Thank you.

Senator Kennedy and I were together in New England at one time during two of these hurricanes. It is with pleasure that I accede to his request and read the following letter, dated April 20, 1955:

> DEAR MR. CHAIRMAN: I deeply regret my inability to attend the hearings of the Senate Committee on Public Works on S. 414 and other bills arising out of the hurricanes of 1954. I strongly urge favorable action by your committee on S. 414, in order that New England may receive at the earliest possible opportunity a comprehensive survey from the Army Corps of Engineers detailing those steps necessary to prevent further hurricane damage, and to repair beaches and other structures for which the Federal Government has some responsibility and which were damaged by the 1954 hurricanes. It is urgent that work begin immediately to prevent further beach erosion, repair damaged breakwaters, and establish protective work against tidal flooding.
>
> This legislation is, I believe, enthusiastically supported by every member of the New England Delegation in Congress. Hurricanes are disasters which do

not permit consideration of partisan differences; nor are such disasters limited to the New England area alone. The frequency of east coast hurricanes in 1954 indicates that this may well be a major and recurring problem for New England; but we ask no more than the assistance which has been given to other regions suffering from other types of disaster. I was on Cape Cod at the time Hurricane Carol and Edna struck in the fall of last year, and I can testify personally to the heavy damage to the beaches, shore developments, and waterfronts on the southern and eastern shores of Massachusetts and the islands off the coast. As you will recall, these storms took a heavy toll in New England in terms of human life, property damage, boats wrecked, power lines down, and other forms of destruction. Damage to industry, of course, means a considerable decline in the tax revenues of the Federal Government as well as a general decline in the economic prosperity of our area.

For these reasons I am hopeful that your commitee will take prompt action on S. 414 and other bills providing for the survey and restoration of facilities damaged by the 1954 hurricanes, as well as the prevention of future damage; and, moreover, that your committee will take action, or join with me in urging the other appropriate committees of Congress to take action, to provide a more adequate system of warnings against future hurricanes.

I might add that we in Massachusetts feel very strongly about this question of a more adequate warning system. As I understand several distinguished representatives of New Bedford industry have already pointed out considerable loss of life and property was averted during Hurricane Edna because of sufficient advance notice, and the terrible destruction of Carol could similarly have been reduced had the Weather Bureau been equipped with better facilities for this purpose.

I have discussed this matter with my good friend Senator Symington of your committee, who was born in Massachusetts, and I have asked him to read this letter into the record on my behalf.

With every kind wish, I am

Sincerely yours,

JOHN F. KENNEDY.

Mr. Chairman, I know we all regret that Senator Kennedy cannot be here to appear at this time for his great State. With your approval I will submit this letter for the record.

Senator KERR. It will be entered in the record.

Thank you very much, Senator.

Mr. A. Perry Avery, vice president, Providence Chamber of Commerce.

STATMENT OF A. PERRY AVERY, VICE PRESIDENT, THE GREATER PROVIDENCE CHAMBER OF COMMERCE

Mr. AVERY. Mr. Chairman, members of the committee, my name is A. Perry Avery. I am a vice president of the Greater Providence Chamber of Commerce and chairman of its retail trade board. I am also the owner and operator of the Avery Piano Co., with a retail store at 256 Weybosset Street in the center of Providence, R. I. I appear here representing the Greater Providence Chamber of Commerce and my own company.

Experience indicates that Providence is in the course which has been and may well continue to be taken by hurricanes originating in the Caribbean Sea. This has been only too clearly demonstrated by the fact that in 1954 three serious hurricanes passed over or near Providence within a short space of time.

Providence being located as it is at the head of Narrangansett Bay, the condition of the tide, when a hurricane strikes, has a great bearing on the extent of the damages suffered by our city.

Hurricane Carol struck Providence virtually at high tide. The net result was that the tide rose exactly 13 feet above normal high water.

Virtually the entire downtown shopping district was submerged when this happened, with catastrophic losses being suffered by the merchants, banks, and other commercial downtown businesses. It was only by the grace of God that there was not a severe loss of life from this flooding.

The special report on hurricanes by the New England-New York Inter-Agency Committee indicates that the total damage wreaked by "Carol" in Rhode Island was approximately $200 million. This same report shows that damage to commercial properties (exclusive of industrial plants) in Providence was approximately $40 million. This loss does not reflect losses in business suffered by these commercial establishments, but only property damage losses to buildings and contents.

For example, our largest department store—that store is only about a hundred yards below me—suffered in excess of a half million dollars loss. Unfortunately this loss, caused by rising water, is practically uninsurable.

I might point out that the total losses reported are exclusive of damage to State facilities, railroad installations, communication and power companies, as these figures were not available by localities.

Most stores and services in downtown Providence were closed for at least 1 week following Hurricane Carol, while a round-the-clock rehabilitation was taking place. Hurricane Carol was followed shortly by Hurricane Edna. While the winds were as strong with Edna, it fortunately arrived at low tide, so that while the water was well above normal high tide, it did not actually flood the city. Most stores, however, had boarded up their windows, sandbagged entrances and taken all possible precautions to keep out water, as well as moving merchandise to higher levels, wherever possible. This kind of protection is expensive and inadequate.

We have reached the somewhat logical conclusion that we are going to have to be prepared to live with hurricanes. The average merchant, large or small, cannot waterproof his place of business to the extent that he can keep out floodwaters. Therefore it appears that some type of protective facility must be built which will keep the water out of downtown Providence under flood conditions.

While we will not go into great detail, we should like to point out that in 1938 a similar hurricane struck Providence, also at high tide, with a resulting flood of 13 feet, 9 inches above high water in Providence. In addition to the financial catastrophes which befell us there was a great loss of life resulting from the 1938 hurricane, including a considerable loss of life in the downtown Providence area.

We had boats floating around through the streets at that particular time, picking up people.

Since the hurricanes in the fall of 1954 several buildings have had to be torn down in the Providence shopping district, since they were so badly damaged structurally by the flood that it was physically impossible to rehabilitate them. This, coupled with the fact that many small-business men lost their entire life savings in their business, has caused an extremely large number of vacancies in the downtown shopping center.

Many of those who reopened have moved out of the center of the city, even into other cities, with a resulting reduction in the tax base for the city of Providence. Who can blame a merchant for moving

his establishment when his place of business is completely submerged twice within 16 years.

I should like to make it clear that my own place of business was not flooded, although the water came almost to my front door, since I am located in the higher section of the district. Electricity and telephone service were completely knocked out in the downtown business section and even those stores which were not flooded were unable to do business for several days due to lack of electricity, even though they could function without telephones.

Nowhere have I seen a compilation of the amount of income lost by the fact that many businesses were closed for more than a week following Hurricane Carol. However, these losses must be staggering and the net loss on Federal income tax to the United States Government as a result, thereof, would not be inconsequential.

We submit, herewith, for your perusal some pictorial evidence of the city under flood conditions. We strenuously urge that the United States Army engineers be directed to immediaately conduct a survey of Narragansett Bay and draw up recommendations for construction of appropriate facilities to prevent further flooding of downtown Providence from hurricane-driven tides.

For your further information, we present copies of the Hurricane Carol pictures compiled by the Providence Journal Co.

Thank you for the opportunity of appearing before you.

Senator KERR. Thank you, Mr. Avery. We are glad to have your statement.

Mr. Dahl, President of Hammel-Dahl Co., Warwick, R. I.

STATEMENT OF E. T. DAHL, PRESIDENT, HAMMEL-DAHL CO., WARWICK, R. I.

Mr. DAHL. I am Edward T. Dahl, president of the Hammel-Dahl Co., also president of the Warwick Industrial Park and a member of the Industrial Commission of Warwick.

I wish to present my full support to bill S. 524 for investigation of damage to Narragansett Bay and southern New England shores and to offer my cooperation and assistance in any way possible with plans for effective protection against tidal flood damage.

In investigating the extent of our damage I hope that the Corps of Engineers will seriously consider not only all of the damages as valued in dollars, but also the incalculable threat to human life, health, homes, and the productivity of the entire area.

Water damage is preventable and it can be accomplished by a master plan integrated with broad national interest. Many plans have been suggested, and I believe that the Corps of Engineers should seriously consider them all. Also, I hope that they will consider the plan in which I am vitally interested; namely, the complete protection of Narragansett Bay by construction of breakwater dikes at the east and west passages of the bay.

I know that the Corps of Engineers has the technical knowledge, ability, and manpower to perform this task. I know there is a vast fund of information and resources available to the Corps of Engineers which would enable them to formulate and execute a master plan.

It is of paramount interest to all of us that this bill be passed as soon as possible and money be appropriated for this work.

In some of the remarks that were made here regarding a priority plan for the areas most hurt, Narragansett Bay, including Warwick, Providence, New Bedford, and Fall River, are all within that bay. I would like to suggest that that plan be given the first priority because it would protect the major damage of the entire New England area.

Senator BUSH. Mr. Chairman, I move that the plan as submitted by Mr. Dahl be incorporated in the record, and a copy sent to the Army engineers.

Senator KERR. That will be done.

Thank you, Mr. Dahl for your contribution. I want to say that I am impressed by the study and energy that has been devoted to this problem by these witnesses.

Senator BUSH. I would like to certainly concur in that impression. It is very impressive indeed. Of course it is increasingly evident what a very serious matter this is in the area which these gentlemen represent.

(The document referred to above is as follows:)

NARRAGANSETT BAY AREA PROTECTION PLAN

(By E. T. Dahl)

The physical dimensions of the proposed breakwater are as follows:

The west breakwater would be 5,300 feet in length with a 40-foot wide crest and a base of 180 feet, total high of approximately 70 feet.

The dimensions of the breakwater of the east Passage would be, again, a 40-foot wide crest, 280-foot base and approximately 120 feet wide, and 2,300 feet in length.

The proposed freeboard above highest known hurricane waters would be 20-feet.

The total amount of quarried stone will be approximately 4,500,000 cubic yards.

The maximum width for the entrance passages shall be 1,000-feet for 2 reasons: 1—safe width for navigation; 2—to keep the velocity at the height of flood and ebb tide to a safe figure.

The approximate cost figure by local contractors for stone quarried in this vicinity is at the rate of $5 per yard—approximately $22,500,000.

The present rise and fall of tides in Narragansett Bay are as follows:

Newport mean range 3.5 feet, spring range 4.4 feet.

Providence mean range 4.6 feet, spring range 5.7 feet.

The difference between the two, in mean ranges, is due to the funneling action within the bay. This phenomenon is more pronounced in other locations, such as the Bay of Fundy, with a tide at the inlet ranges of about 15-feet, whereas the tide back from the inlet, situated somewhat like Providence, is 35-feet. All of the differences are not due to wind,—merely funneling action.

During Hurricane Carol, the tide in Newport rose 12.5 feet above mean low water, which means that it would be 9 feet above mean high water.

We believe the construction of the breakwaters would limit the rise inside the breakwater to approximately 4 feet. Therefore, the maximum tide at Providence, due to the funneling action, will be 5 feet. However, wind action must also be considered, which would probably increase the water several feet more. The action of wind is unpredictable, due to the different directions that it may follow. Across the bay there would be practically no rise. With the length of the bay, there will probably be a rise as indicated by the pileup of water in our Great Lakes.

From references, taking a purely theoretical wave heights to add to the rise of water to determine the maximum height with the lip of a wave a lip would be 8½ feet above the normal quiet surface, and this has never been experienced.

The maximum lip that has ever been experienced, in nature, to our knowledge, is two-thirds of this or approximately 5 feet, but in Narragansett Bay, which is studded with islands and points of land, there is not enough room for the wind to kick up waves even of this height.

If all of this is found to be correct from the records of the Army engineers, it would mean that the water in Providence would be at a maximum approxi-

mately 7 feet, which would keep it below the street levels of downtown Providence.

There is a similar example of the movement of water at the Harbor of Refuge, where the tidal cycle is based on actual benchmarks installed by the Army engineers where the tide inside the breakwater, even with the very large openings in proportion to the basin area is listed as 3¼ feet outside the harbor and 2¾ feet inside, which gives you a difference of one-half a foot.

During the hurricane of 1938 Napitree Point on the southern shore of Rhode Island was breached by the hurricane and the residents around the Little Narragansett Bay and along the Pawcatuck River up to Westerly have reported an increased height in the tidal cycle proving that a restriction such as we are proposing can reduce the tidal action for the entire Narragansett Bay area.

ECONOMICS OF THIS PLAN

The total loss to hurricane tidal waters within Narragansett Bay from 1938 through 1954, when divided by the span of years which is 16, gives an annual loss to Rhode Island of $9 million. This amount would pay principal and interest for a $75 million loan, if amortized over a period of 15 years. And, of course, during that span, we could have been fortunate enough to have even greater loss from other hurricanes, from which we were spared.

There have been some comments regarding the effect on marine life if such breakwaters were built, but the Marine Laboratory at Sannderstown has stated that, even though the tidal action would be dampened, and the bay would have slightly less salinity, the fish and shellfish life would be undisturbed. In fact, it has been said, that, due to the reduction in salinity, there would be a good chance that it would encourage the propagation of oysters.

Comments have also been made regarding increased pollution in Narragansett Bay due to the decrease of interchange of ocean water in the bay, but this would not be true as present flushing action in the bay is very slight.

Comments also have been raised regarding the velocity due to tidal action through the entrance to the bay, but we find that the maximum average velocity in the natural channel is very slight, and the maximum velocity which lasts but for a short time, is the highest in the East Passage, of 1.8 knots, and in the West Passage, 1.1 knots.

The estimated velocity through the two 1,000-foot gaps in the breakwater would be 3.5 to 4 at the peak, which is exactly the same as that presently experienced in the Cape Cod Canal, which is narrower and more difficult to navigate for large vessels than the 1,000 foot openings which we are recommending, which, incidentally, is the width of the navigable channel now used by merchant and naval vessels. Such velocities have been discussed with the bay pilots and master mariners, yachtsmen, and others. It is their collective opinion that such velocities would be perfectly safe. The location of such breakwaters could be placed in many spots and also the type of breakwater can be reduced in cost by hydraulic dredging of the present bottom to spits of sand similar to Conimicut Point but faced with quarried stone.

It is conceivable that, because of the shallow water and the relatively narrow span under the Jamestown Bridge that this tidal barrier could be dredged and faced up at this point rather than down at the Bonnet.

There have been many comments regarding the possibility of closure of one of these gaps, due to war or enemy action, but it must be remembered that this construction could be quite easily blasted free, dumping the excess rock into the adjacent deep water, so, to our mind, it would be impossible to bottle up either the East or the West Passage.

It is reported that Army engineers do not wish to use drawbridges which may be disabled, bottling up a fleet, but I believe that, due to the depth of water, if a drawbridge was damaged, it could be blasted into the deep water in a very short time so that it seems to us that these breakwaters could be used for freeways, roadbeads, which would be of more assistance in a national emergency than a hazard to navigation.

In conducting our research on this type of breakwater, we find that all the foreign and domestic breakwaters that we looked into were of the Harbor of Refuge type of construction, with which we are all familiar. However, they were not constructed to reduce tides or hurricane levels for the simple fact, that, at no place that we could find, was there ever such a condition where such a large area in proportion to the tidal gaps, existed.

This plan would be of no value for New Bedford, where the enclosed area is extremely small and this was reported by the Army engineers who referred to the fact that it would a plausible scheme for a body of water the size of Narragansett Bay. We believe that this plan is plausible and that it can be financed in that it protects a large area of 2 States, not 1, and innumerable cities, villages, and shore properties, as well as the naval stations and naval airbases.

The cost of 2 modern destroyers, which could be lost in a hurricane, would more than pay for the 2 protective breakwaters.

Senator KERR. Mr. Arthur B. Gervasini, town clerk, Westerly, R. I.

STATEMENT OF ARTHUR B. GERVASINI, TOWN CLERK, WESTERLY, R. I.

Mr. GERVASINI. Thank you.

I am the town clerk of Westerly, R. I. The town council of the town of Westerly voted that I and the town solicitor appear before this hearing in support of the bill S. 524. The town of Westerly has suffered several hurricanes in the past. Three have been very expensive to the town. They have crippled the town facilities for at least 2 weeks until emergency repairs could be made at considerable expense to a small community.

We are located on the western end of the southern shore of Rhode Island. We have a beach area, a recreational area of approximately 9 miles; 30 years ago, from my own personal observation, these beaches were supported, the land beyond the beach was supported by dunes that ranged approximately from 6 to 20 feet in height.

Senator KERR. Do you mean protected?

Mr. GERVASINI. These were natural dunes on the shoreline—sand dunes. They ranged from 6 to 20 feet in height. Since these three severe hurricanes—1938, 1944 and 1954— these dunes have practically disappeared. We have an area, recreational area, of approximately 4½ miles that at the present time with the tide the ocean comes over the beach and into the pond beyond.

If there is anything going to be done to protect the shoreline, it should be done as soon as possible because I am wondering what would happen after a few more storms. I think you can understand the position of the town of Westerly.

I want to thank you again for the opportunity of appearing before you.

Senator KERR. Thank you, Mr. Gervasini, for coming here and giving us the benefit of your information and views.

Mr. Frank Cappuccio?

STATEMENT OF FRANK CAPPUCCIO, TOWN SOLICITOR, WESTERLY, R. I.

Mr. CAPPUCCIO. I represent the town of Westerly also. I am the town solicitor. Also the village of Watch Hill and Misquamicut, part of Westerly. We would like to make clear to the committee that I do not want to flatter Rhode Island too much, but for many years before the 1938 hurricane, southern Rhode Island came to be known as the Miami of New England.

If you would look at the topography of that particular shoreline from Greenwich, Conn., all the way to Massachusetts, you would find

that the southern shores of Rhode Island were really a beautiful beach area, unsurpassed throughout the length and breadth of our country, not barring the California coast.

We have these beautiful homes. Sand was of the most beautiful white you could conceive of. There were no rocky crags or marshland to speak of. If you travel by train through this area, without trying to disparage the State of Connecticut or some of these other States, you do find certain marsh areas, rocky areas, craggy areas, but this southern shore of Rhode Island was really a real beach area which supported the economy of our State.

We must appreciate that Rhode Island is a very small State. You multiply 70 miles by 40 miles and you have only about 2,800 square miles. That is the whole State. When you get half of the State of Rhode Island being hit by hurricanes and being flooded, that is a pretty serious problem.

In a large State if you had a storm, a certain segment of the State might be hit and it would not affect the economy so seriously as our town or our State. Even if this hurricane had not happened, assuming that we did not have a 1938 hurricane, and that we did not have a 1944 hurricane or a 1954 hurricane, we did have a serious problem which the records of the Federal Government will reveal.

We had a serious erosion problem setting in over a period of years. The I Corps of the Army Engineers in New England, operating out of Boston, I think, Colonel Whitcomb, has come down there many times over a period of 8 or 9 years and made an exhaustive research.

We have an area there that used to be a defense area. It had a tremendous fort during the Spanish-American War known as Fort Mansfield. It was Federal property. It was an area of about 2 miles in length and during the 1938 hurricane many lives were lost there. It was completely destroyed and has never been rehabilitated. It is a sandbar.

The Federal Government, in order that, if there might be a question of priority in this discussion, even then the Federal Government was considering that area, considering this portion of our State, the westerly area, that it does come within Federal participation. If there is an area of disagreement that Federal funds cannot be used in certain scopes in certain States that are local in nature, as far as that portion of Rhode Island is concerned, it does come within the purview of the Federal Government.

We have Little Narragansett Bay and we have this Napatree Point 2 miles in length that is constantly eroding. Ever so many years the Federal Government has to spend, on the recommendation of the Corps of Army Engineers, millions of dollars to dredge Little Narragansett Bay, not to confuse it with Providence in our part of the State.

On our part we have Little Narragansett Bay. There should be a priority there to stop this erosion. Ever since the hurricane has become so bad that in time Little Narragansett Bay will practically be shut. Ships cannot come up there, small craft. Bear in mind we are only 12 miles by sea from New London, which is a very important defense area, as Senator Kerr knows and the other Senators here.

During wartime, for small craft, and others, Little Narragansett Bay, the area where we live, is vital in defense for small craft such

as PT boats and other defense area discussion. But with two or three groins put up in this area we can prevent the erosion and, secondly, we can practically reduce the danger of a hurricane by 50 percent.

We have the stone. As you well know, Westerly has a tremendous amount of granite. We have these tremendous granite quarries with this rock piled up for miles and miles. It does not cost too much. Unfortunately, on a local level or a State level, it is pretty difficult. With two or three groins stretching out a mile and a half or so the erosion problem can practically be conquered.

As far as the hurricane damage, while it cannot be prevented it can be reduced at least 50 percent.

I thank you.

Senator KERR. Thank you, Mr. Cappuccio.

Judge Watts?

STATEMENT OF JUDGE JAMES O. WATTS, NARRAGANSETT, R. I.

Judge WATTS. Mr. Chairman, I have an original and two copies of the supporting documents from the town of Narraganset.

I want to thank Senator Green and Senator Pastore not only for introducing the bill but for inviting us to participate in this. We can all add a little to it.

The town of Narragansett is situated at the very southernmost part of Rhode Island, and right at the focal point of southeast hurricanes. Years ago when hurricanes, so far as we know the first known hurricanes hit us, those beaches were only used for seaweed purposes for the farms and for raising the famous Narragansett Racing Pacers. Times have changed.

Strange as it may seem, so far as Narragansett is concerned, those four beach areas, particularly the Narragansett Pier Beach which is municipally owned, and on which the town of Narragansett is now spending $416,000 to rebuild the installations, those series of beaches are the heart of the economic life of the town of Narragansett.

That, together with the fishing industry, which is also very important, constitutes our economy. Our problem is different than that of Providence. We are hit by a tremendous wall of water from the hurricane. It hits us suddenly, very strongly; wipes everything out before it. We are not situated all on lowland. The town of Narragansett has about 12 miles of coastline. But there is only about a stretch of 4 miles altogether where these valuable lowlying lands and beaches and harbor installations are, and I have listed them in this memorandum.

There is the Galilee Beach, which is State-owned and operated, Scarboro Beach, State-owned and operated, and then there is the very prize of them all, Narragansett Pier Beach on which is located the Narragansett municipal installations, bathing pavillions, cabanas, and also the Dunes Club installation. Also Wesquage Beach, which is supported and operated by the Bonnet Shores section.

I have marked those on the topographical map which I have submitted with this report. I am not going to dwell on this memorandum but will leave it with you. I have tried to point up the value to other States of this little strip of land called Narragansett.

In other words, why should you spend money on this. Of course it suffered tremendous damage. I have put it in here. The fishing fleet

was damaged. The fishing fleet produces food, over a million dollars worth last year. The damage to property in Narragansett was over a million dollars, privately owned, and over $400,000 of municipal installations, damaged for the most part by tidal waters.

In my judgment it is not going to be too much of a job to protect those four separate stretches of land if they can be protected at all after study. The town of Narrangansett is important to national defense. We have three forts there. We have Fort Green, Fort Varnum, and Fort Kearney. They were all activated in wartime.

We have the fishing fleet which produces food and also which serves as lookouts for submarines. Practically every one of those vessels are equipped with radio and instructions from the Navy as to what to do. It helps to serve people who are injured in wartime. We have had survivors from torpedoed ships taken care of there. It is important to civil defense.

Because of the fact that we are a small town in population—but we can readily expand our facilities to take care of a great many refugees.

We have 11 recognized hotels. They are not little things. They are good-sized hotels. We have about 50 boarding houses, several apartments, over 400 summer cottages, and in an emergency we can take care of those people who might be hit. We are not a target area. The point I make, however, is that we have got to keep that town economically sound in order that we can do all these things and play our part in the national economy and national help.

Strange as it may seem, the heart of the whole thing, as far as our town is concerned, is in those beaches. So if you can do something to see that this bill gets speedy action it will be appreciated.

Senator KERR. Thank you very much, Judge Watts, for your very able and constructive statement.

(The document referred to follows:)

SUPPORTING MEMORANDUM OF TOWN OF NARRAGANSETT

To the honorable the Committee on Public Works of the United States Senate:

The town of Narragansett, an incorporated township of the State of Rhode Island, respectfully urges that S. 524 pending in the United States Senate be acted upon favorably.

Narragansett is situated at the southernmost point of the State of Rhode Island on the shore of the Atlantic Ocean at the gateway of souhern New England and at the focal point of southeasterly hurricane tidal waters.

It has a coastline of approximately 12 miles. Most of this is high land above the reach of the full force of hurricane waters. However, there are four separated stretches of important low-lying beach and harbor areas, namely, Galilee harbor and beach for about 1 mile, Scarboro Beach for about 1½ miles, Narragansett Pier Beach for about 1 mile, and Wesquage Beach for about one-half mile, making a total of about 4 miles of valuable and important installations to be protected.

The heart of the economic life of the town of Narragansett is this series of low-lying beach and harbor areas.

The town of Narragansett is very strategically located with reference to the welfare of southern and central New England from the following points of view: national defense, civil defense, commerce, and production of food.

National Defense.—Within Narragansett are located Fort Green, Fort Kearney, and the Point Judith Coast Guard Station, and the smaller Fort Varnum. In wartime these forts are activated. Furthermore, these areas which need protection are used in wartime for training purposes in making beachhead landings. Moreover, in wartime the facilities of this area have been used for the assistance of survivors from submarine sinkings. No area in the United States of such small dimensions is as strategic to the defense of Southern New England and New York as this Narragansett section.

Civil Defense.—The town of Narragansett is a residential resort and fishing-industry community. It is presumably not a target area. It has according to the 1950 census a population year round of 2,288. This expands in the summer about 10 times that number. It has 16 licensed taverns of which 11 are recognized hotels, 50 licensed rooming houses, about 400 summer cottages to rent, and about 75 apartments for summer rental. This town is conveniently located within easy transport of the heavy populated metropolitan areas of southern New England. It has a well-staffed and equipped civil defense corps. It is a mutual-aid town, so-called.

Commerce.—Narragansett through the harbor at Galilee is the main center of the fishing industry of southern New England. There is located the Point Judith Fishermen's Cooperative Association, Inc. and the Point Judith Dehydrating Plant. The Fishermen's Cooperative alone handled $1,230,000 worth of fish in 1954. There are about 65 fishing boats operating in and out of this port with a total valuation of about $1,300,000. About 15 of these boats hail from the Connecticut shores. Added to this is the fleet of yachts which are berthed at this harbor, including the fleet of deepsea fisherman boats which hold the annual tuna derby based here. Then there is the resort commerce patronized by people not only from Rhode Island but largely from Massachusetts, Connecticut, and New York. It must be remembered that the last hurricane hit right at the height of the season.

Production of Food.—The fishing industry in Narragansett is an important producer of fish and seafood for eastern markets, including New York and Philadelphia.

This area, so important to the welfare of the United States, must be kept economically sound, and its strength lies basically in these low-lying areas of shore frontage which need protection from hurricane waters.

The residential life of this community revolves around its beaches, particularly the Narragansett pier beach. This is a municipally owned beach. The town is currently spending $416,000 of its own funds to restore the installation of its bathing pavilion, clubhouse, and cabanas. Without this beach and its facilities, Narragansett as a residential and resort area would not exist economically. On this beach is also located the Dunes Club with its bathing facilities and cottages which is a very important part of the town of Narragansett.

The Galilee Beach and Scarboro Beach are owned by the State and it furnishes bathing facilities at these points. The Wesquage Beach is operated by a private club for the Bonnet Shores section, so-called. All of these beaches are patronized by people who come not only from Rhode Island but from Massachusetts, Connecticut, New York, and Pennsylvania.

The hurricane of 1954 caused damage to private dwellings in the town of Narragansett of about $1,250,000. A great part of this loss was from the heavy wall of water. This storm caused damage to town-owned property of $491,884, most of which was also by the great pressure of water.

It is respectfully urged that this is a Federal problem.

The damage to fishing vessels at Galilee because of the hurricane was estimated at about $200,000. This does not include damage to the tuna fleet, so-called. These vessels were all in harbor. Likewise, it is respectfully submitted that this is a Federal problem.

Attached to this memorandum is a list of statistical information for the use of the committee.

TOWN OF NARRAGANSETT, R. I.

Population according to 1950 census	2,288
(Increased to 10 times that number in summer.)	
Number of hotels	11
Number of cottages for rent in summer	400
Number of apartments for rent in summer	75
Approximate frontage of low-lying beach and harbor area:	
	Miles
Galilee	1
Scarboro	1½
Narragansett pier	1
Bonnet Shores or Wesquage	½
Total low-lying valuable beach and harbor to be protected	4
Approximate total shore frontage in town of Narragansett	12 miles

TOWN OF NARRAGANSETT, R. I.—continued

Assessed valuations in the town of Narragansett:	
Land	$5,687,325
Buildings	11,255,800
Tangible	3,194,570
Total assessed valuation	20,137,695
Approximate yearly production of fishing industry	$1,230,000
Approximate value of boats & equipment invested in fishing industry	$1,300,000
Approximate damage and destruction to fishing boats in the 1954 hurricane	$200,000
Total amount of damage to privately owned property as result of 1954 hurricane	$1,250,900
Total amount of damage to town-owned property as result of 1954 hurricane	$491,884
Approximate number of boats operating out of Galilee (or Point Judith) 50 from Rhode Island and 15 from Connecticut.	

Senator KERR. William Leslie, Jr., director, the Chamber of Commerce, Wakefield, R. I.

STATEMENT OF WILLIAM LESLIE, JR., DIRECTOR, CHAMBER OF COMMERCE, WAKEFIELD, R. I.

Mr. LESLIE. I am William H. Leslie, Jr. I am here as the town solicitor of the town of South Kingstown. My remarks will be brief but they do have a little different tone to them in that our town was probably the worst, or at least one of the worst of the areas hit by the hurricane. The problems are similar to those of the town of Narrangansett which were outlined by the former speaker, Judge Watts.

Our town, however, recognizing the dangers of hurricanes, has been the first if not the only town to enact a strong building code and strict zoning amendments. I have here a small brochure in which the amendments to the zoning act are contained, and some very nice pictures of the damage which our town has suffered.

At the present time the constitutionality of our zoning acts is being argued in the Supreme Court of our State. As you gentlemen know, first the question would be whether the township, under the enabling act of the State, is broad enough to take in the danger of hurricanes.

Secondly, it would be within the jurisdiction of our Supreme Court to determine whether or not the state, under its police power, has the right to govern zoning and hurricanes.

And thirdly, whether or not we are in violation of the due process of the Federal Constitution.

Therefore, it is very important to us in our particular town that this Government give us quick and immediate relief if possible. We expect an early decision from our Supreme Court in reference to the constitutionality of the question and therefore we are interested in that, too. It probably is the first case of its kind in these United States.

I would like to leave a copy of our zoning amendments with you; also some pictures, and how we have designated different areas in our towns as beach danger zones and commercial danger zones.

I want to thank you very much for this opportunity.

Senator KERR. Thank you, Mr. Leslie.

Mr. Nathaniel Smith, Jr., director, Chamber of Commerce, Wakefield, R. I.

STATEMENT OF NATHANIEL W. SMITH, JR., DIRECTOR, CHAMBER OF COMMERCE, WAKEFIELD, R. I.

Mr. SMITH. I want to thank you, Mr. Chairman, for the opportunity to appear. I was designated, together with Mr. Leslie, to represent the town of South Kingstown. He has left with you some pictures of the particular area to which I want to direct your attention.

I have here some newspaper pictures which show as a matter of interest three of the beaches in the town of South Kingstown and also one of the beaches in Narragansett which Judge Watts spoke of.

I would like to direct the committee's attention to the fact that this particular area has already been the subject of a study by the Army engineers. I refer specifically to this report which was submitted to the 81st Congress, House Document 490. That study is a study of the south shore of the State of Rhode Island beach erosion control. I would like to call your attention to a few of the comments made by the Army engineers in that report with particular reference to the East Matunuck area, which has been zoned as beach danger area and with respect to Matunuck Point the picture of the houses submitted by Mr. Leslie are located at the tip of Matunuck Point.

In the report of the Army engineers, paragraph 42, they find that the shore between Westerly and Point Judith is generally stable. By that they mean that there is very little erosion and very little change in the shoreline.

In paragraph 43 they make an exception to that and I will read it:

An exception to the foregoing general statements as to the relative stability of the shore in this area is the condition existing from Matunuck Point eastward to the breakwaters of the Point Judith harbor of refuge. Here the shoreline and offshore depth contours have retreated 500 feet or more, except within about 1,000 feet of the west breakwater where accretion has occurred.

In other words, gentlemen, we have a stable shoreline in South Kingstown with the exception of the East Matunuck area.

In paragraph 49, in their report, they have this to say:

The increased rate of recession of the shore line east of the Matunuck Point since construction of the Point Judith breakwaters indicates that the westward drift which existed in this area prior to construction of the breakwaters has been stopped.

The point that I am making there is that the construction of the breakwater, which was done shortly after the turn of the century, I believe, has changed the natural forces and as a result we are getting a serious erosion in the town of South Kingstown resulting partly from the construction of the breakwater.

They continue in their report and have this to say, and I am quoting from paragraph 87, about the beach in this East Matunuck area:

The western portion of the beach area is shown on plate III to have retreated landward considerably, but the existing beach is adequate for present usage. With respect to danger to human life during storms the situation is the same as as the shore of Point Judith Harbor, in that the only highway leading inland from the area is inundated in severe storms.

In this area, gentlemen, four people were drowned in the storm last August.

Part of the difficulty there lies in the fact that the State highway bridge is low. It is only about 3 to 4 feet above tidewater and is completely under water at height of a hurricane.

Going further into the report the engineers have this to say in paragraph 89:

> In connection with a beach-building plan, a groin system should also be provided to retard the loss of artificial fill, which would be carried eastward by natural forces to Jerusalem Beach. Construction of a dune to prevent landward loss of sand over the beach would also be desirable. A possible source of material for artificial beach restoration or dune building is Potter Pond.

In other words, in this report they have made specific recommendations as to the steps to be taken to correct the erosion of the beach at this particular place. They go on to comment on Matunuck Point and they have this to say, and those are the pictures, Mr. Chairman, that you have just been looking at.

Quoting from paragraphs 90 and 91:

> The most critical location, where protection is urgently needed, is the point itself. Here several buildings are threatened with undermining as the bluff is eroded.
>
> 91. Protection of the Matunuck Point headland can be provided by constructing an adequate sea wall or bulkhead, or by grading and revetting the slope. The latter method is considered satisfactory and less costly than a seawall or bulkhead. The application of this method to Matunuck Point is illustrated on plate IX.

The point I would like to make is this: In the case of Matunuck Point and East Matunuck marshland we have already had a study. We have recommendations by the Army engineers. This is the result of their study in 1948 which was filed with Congress in 1949. We are very much interested in the Governor's comments with respect to priorities and we feel very strongly that we should have prompt attention to this area because the efforts that the town is making to first rezone the area and then develop a program of land use which will be constructive and beneficial to both the State and the town hinges on our ability to obtain the necessary assistance because it is beyond the resources of the town to do this job of protecting Matunuck Point, protecting the point against the serious loss of property which occurred in 1938, which further occurred in 1954, and was forecast by the Army engineers in this report.

There is a discussion in the report of the history of the storms, a forecast of what will happen with further storms. The storm occurred last August and it happened exactly the way the Army engineers said it would.

We lost in the East Matunuck area 53 percent of the taxable property. That was destroyed. That includes land and buildings. In other words, it wiped out practically all the improvements in the area. That has now been rezoned.

We do feel that we are going to require some measure of Federal assistance to carry out this program. We realize that it is a rather small area, it is one single area along the coast of Rhode Island, but a small amount of assistance in this program will enable us to rehabilitate the entire section.

I want to thank you, Mr. Chairman, for this opportunity.

Senator KERR. Thank you, Mr. Smith, for your statement and contribution.

STATEMENT OF FRANK L. MARTIN, TOWN SOLICITOR, BRISTOL, R. I.

Senator KERR. Do you have copies of your statement?

Mr. MARTIN. I regret that I do not. I would like to ask the committee to permit me to submit a copy of the statement in suitable form for the record.

Senator KERR. That will be allowed and made a part of the record.

Mr. MARTIN. I am Frank Martin, town solicitor of Bristol, R. I. I am making this statement to the committee at the direction of the town council of the town of Bristol to advocate adoption of a hurricane survey bill which it is considering.

The town of Bristol is situated on a peninsula on the eastern shore of Narragansett Bay at the point of confluence of that bay and Mount Hope Bay. The compact part of this community of some 13,000 people borders on an arm of Narragansett Bay known as Bristol Harbor. The harbor extends out into the broader reaches of Narragansett Bay in a generally southerly direction, and it is open and unprotected to the elements of the sea and wind in that direction.

Twice in recent experience Bristol has been seriously assailed by the ravages of hurricanes, once in 1938 and once in the series of hurricanes in the late summer of 1954. This community and others have also been subjected to storms of lesser intensity approaching it from the southerly direction of the open mouth of its harbor and resulting in property damage to the residents of the community.

One of the principal zones of industrial and commercial activity of Bristol is located along the shores of Bristol Harbor, with the industrial and commercial valuation in excess of a million and a quarter dollars. The preservation and protection of these properties are matters of vital concern to the municipal officials of Bristol, both from the viewpoint of tax revenues and the investment returns and the livelihoods gained by the establishments and employees located therein and engaged thereat.

In addition, several municipal properties such as fire stations and sewage pumping stations, are situated along the harbor waterfront, representing substantial expenditures of public money in these installations which are directly affected by tidal floods caused by the hurricane-type storms.

Both of these municipal installations, as can be readily seen, are directly connected with public safety and health, and are utilized for purposes which may not be interrupted without serious consequences.

At the present time the town of Bristol is beset by serious problems of industrial unemployment of its citizens. Upwards of some 1,200 employable citizens are unable to obtain a livelihood in their customary occupations, it has been estimated. One of the principal plants in which hundreds of workers were previously engaged in gainful employment is located along the waterfront of Bristol Harbor.

The municipal authorities of the town, acting through a civic industries committee, is endeavoring to induce a resumption of industrial activity in this plant.

It is felt that if the hazards of destruction to property is added to the industrial phase of this problem, it may well present an insuperable difficulty.

In addition to the foregoing industrial and commercial installations situated on this waterfront, an increasingly important fishing

industry operates therefrom. The visitation of a hurricane and tidal destruction attendant therewith result in the destruction of the fishing vessels and the onshore buildings connected therewith.

It is felt that this contribution of this activity to the economy of Bristol must be protected. Consequently, the town of Bristol wishes to join with the officials of the State of Rhode Island and of the other communities of that State in urging this committee to take such steps as may be necessary to adopt a course of action which may prevent the recurrent destruction which is visited upon the communities bordering Narragansett Bay from hurricanes.

I want to thank the committee for the opportunity of presenting this statement.

Senator KERR. We thank you, Mr. Martin, for your very able statement.

Mr. Roswell S. Bosworth, Jr., chairman, Harbor Development Commission, Bristol, R. I.

STATEMENT OF ROSWELL S. BOSWORTH, JR., CHAIRMAN, HARBOR DEVELOPMENT COMMISSION, BRISTOL, R. I.

Mr. BOSWORTH. I am Roswell Bosworth, Jr., chairman of the harbor development commission.

Gentlemen, because of the hour I feel that the prepared statement which we have stands on its own merit. At your pleasure I will either read it or submit it as testimony.

Senator KERR. At your pleasure.

Mr. BOSWORTH. I feel that the testimony speaks for itself. I would like to point out one fact and that is that next to Providence on Narragansett Bay the town of Bristol received the second highest amount of damage from flood. We feel that this inescapable fact is important enough that the survey be carried out in that territory.

Thank you very much.

Senator KERR. Thank you very much, Mr. Bosworth. Your statement in full will be made a part of the record.

(The statement is as follows:)

HARBOR DEVELOPMENT COMMISSION,
Bristol, R. I., April 20, 1955.

SENATE COMMITTEE ON PUBLIC WORKS,
Washington, D. C.

GENTLEMEN: Attached are two copies of the report of the Harbor Development Commission of Bristol, R. I., which we would like entered as testimony at the public hearing conducted by your committee on this date.

Respectfully submitted,

ROSWELL S. BOSWORTH, JR., *Chairman.*

REPORT TO THE SENATE COMMITTEE ON PUBLIC WORKS, RE HURRICANE PROTECTION, BRISTOL, R. I.

The most extensive damage received in Bristol during the recent hurricanes (1938 and 1954) has been through wave and flood action. The damage in Bristol by water as reported by the Corps of Engineers survey following the August 31, 1954, storm was set at $2,608,500. This damage was second only to Providence on Narragansett Bay, according to the Rhode Island Development Council report of January 1955, relating to tidal protection.

Of the two types of damage, wave and flood, we feel that wave action was the most severe. This is based on personal observation during the storm and investigation following. Waves destroyed a vast number of boats and waterfront

buildings. The lack of adequate protection for boats in the August 31 storm caused death, injury, and great damage in Bristol Harbor.

Our commission has acknowledged several times that Bristol Harbor cannot be protected in its entirety. The expenditure for such protection would far exceed the value of the property protected. There is an important medium, however, which we feel may be reached, whereby a minimum of expense would bring a maximum amount of protection to waterfront interests.

This protection should be aimed at the dual role of safeguarding the highly built-up section of the waterfront between Walker's Cove and Poppasquash Road in the downtown section of Bristol, plus affording a refuge for commercial and pleasure boats on this part of the bay. This protection, we feel, would best come in the form of a breakwater at least as high as a flood tide. Its advantages would be:

1. Valuable property on the waterfront, which for varied reasons cannot be located on higher ground, would be protected substantially from wave action. Included in this highly built-up section are a large shellfish industry, a United States Coast Guard Depot, a concentration of valuable industrial property, a lumberyard, a ferry line, the Herreshoff Yacht Yard, Inc., two restaurants, a proposed State marine patrol base, and a town waterfront development.

2. It would serve as a refuge for commercial and pleasure boats in this section of the bay, which now offers no such protection under hurricane conditions. The harbor is located in the geographical center of the bay, and it is large and easily accessible.

3. A breakwater would also offer protection to boats during the more usual storms and the prevailing southerly winds of the summer. This type of protection is vital to the important shellfish industry of the town. Indirectly the economy of many waterfront businesses would be materially helped because of their close dependence on the commercial and pleasure boats using the harbor.

The town of Bristol has been pushing its harbor development during the past year, with promising results. The key to this program is proper protection. Because the harbor is centrally located and is the largest and deepest harbor in the vicinity, we feel that the Congress is justified in including a breakwater in any plans for hurricane protection in Narragansett Bay.

We feel certain that the city of Providence must be placed first in priority in protection because of its tremendous importance to the welfare of the whole State. If, however, the findings of the Corps of Engineers stand as the permanent record, there is little doubt that Bristol Harbor must be considered seriously in any forthcoming study.

In addition we feel that the Federal Government, along with the State government, would benefit to a great degree from any type of protection because of the substantial holdings both have on the Bristol waterfront.

Senator KERR. Mr. John R. Cottam, president of the Exchange Realty Co. of Providence.

Is Mr. Cottam here?

(No response.)

Mr. Theron S. Curtis, chairman of the Providence Hurricane Protection Committee, Building Owners and Managers Association.

STATEMENT OF THERON S. CURTIS, CHAIRMAN, PROVIDENCE HURRICANE PROTECTION COMMITTEE, BUILDING OWNERS AND MANAGERS ASSOCIATION

Mr. CURTIS. Mr. Chairman and gentlemen, I am Theron S. Curtis, engineer and vice president of Industrial National Bank in Providence, in charge of three main office buildings in the heart of the city.

I am here in a dual capacity; first, as chairman of the mayor's committee on hurricane protection and, second, as a member and past president of the Building Owners and Managers Association in Providence, the membership of which represents approximately 1,500,000 square feet of office building space in the business center.

I have had the experience of going through three hurricanes: 1938, 1944, and 1954, and I need not describe here the seriousness of these catastrophes upon the lives and businesses of our citizens.

I do not wish to minimize the effects of these storms upon the shoreline but I feel it is my duty to point out the unique position of the city of Providence. Situated, as it is, at the head of Narragansett Bay, with the usual southeast winds of these storms, over 20 miles of bay water is forced as if in a funnel and it is concentrated on our city. In a small State like Rhode Island, when disaster strikes this capital city of Providence, it disrupts the business life of the whole State. Because of this vulnerable location of our city it is my opinion that, in any study of protection for Narragansett Bay, priority should be given to protection of the city of Providence.

Time is of the essence. All studies show that the period of these storms is shortening. We have had 3 hits in 16 years with 2 close misses just last fall, 1954.

Detailed facts given here by other witnesses will show that in dollars and cents the value of property affected by these storms in the heart of Providence certainly warrants special consideration. After each of these storms we see financial troubles of storekeepers. Others move out of their locations. Buildings are torn down. Already there is a blight on business locations in the center of Providence. It is a question how many more of these disasters we can take and survive.

Several engineering studies have been made by private citizens looking toward a solution of our problem. In my humble opinion valuable time could be saved if the United States engineers could be urged to make use of these studies at the outset.

I am in hearty accord with Senate bill No. 524 but, may I suggest that either through amendment or instruction to the United States engineers, that your committee consider giving priority to the protection of the city of Providence.

Thank you gentlemen for listening.

Senator KERR. Thank you, Mr. Curtis, for your statement.

Senator Green, is there anything further?

Senator GREEN. Thank you, Mr. Chairman, for your patience, for listening to these able representatives of my State here today. I think they have shown conclusively and truly that Rhode Island is entitled to priority in consideration by the engineers, and I hope that while there may be general investigation of what damage is done, what can be done to prevent further damage along the coast, yet that it can all be done promptly, and that Rhode Island will be given that priority. That is the purpose of these men coming, wanting to come, that they may have their statements in person here.

I draw attention to the fact that a number of those who could not come have sent in their written statements which I hope will receive consideration also.

Senator KERR. They may be placed in the record if you have them. Let me say that I can understand the pride that you and Senator Pastore have in your State and its citizens. I know they can understand how we share their pride in their able representatives in the Senate.

Senator GREEN. Thank you.

Senator KERR. The committee will recess until 10 o'clock in the morning.

(Thereupon, at 12:46 o'clock a. m., the subcommittee was adjourned, to reconvene at 10 a. m., Thursday, April 21, 1955.)

(Additional statements received are as follows:)

UNITED STATES SENATE,
COMMITTEE ON BANKING AND CURRENCY,
Washington, D. C., February 4, 1955.

Mr. E. W. BASSETT,
Committee on Public Works,
United States Senate, Washington, D. C.

DEAR MR. BASSETT: Here is a letter from Congressman Albert P. Morano and letter which he has sent to me from Mr. Carl F. Bissell, of Woodmont, Conn.

I would appreciate it if you will keep this correspondence for inclusion in the record of the hearings. Also, will you study Mr. Bissell's suggestion and give me any ideas you may have as to how he can develop it. Also, if any other legislation would be required to carry out the suggestion.

Thanking you, I am

Sincerely yours,

PRESCOTT BUSH, *United States Senate.*

CONGRESS OF THE UNITED STATES,
HOUSE OF REPRESENTATIVES,
Washington, D. C., February 2, 1955.

Hon. PRESCOTT BUSH,
United States Senate, Washington, D. C.

DEAR SENATOR: I enclose a letter received from Mr. Carl F. Bissell, of Woodmont, Conn., the contents of which is self-explanatory.

As you can see, it is his proposal that wherever pier-type installations are established in connection with erosion-control measures, they be so constructed to be adaptable as public fishing piers. He points out that such a proposal be adopted especially when installations are made at State-owned parks. In my district there is one park known as Sherwood Island.

I think the suggested proposal in Mr. Bissell's letter is logical and admirable. Consequently, I hope if and when hearings are held on your beach-erosion control bill you will make Mr. Bissell's letter a part of the record.

Sincerely,

ALBERT P. MORANO, *Member of Congress.*

WOODMONT, CONN., *January 30, 1955.*

Hon. ALFRED MORANO,
Member of Congress,
House Office Building, Washington, D. C.

MY DEAR CONGRESSMAN: May I offer this suggestion for your consideration in connection with plans now being studied to establish shore erosion-control measures along the Connecticut coastline:

That wherever pier-type installations are established perpendicular to the shoreline and connected with it, they be so constructed as to be adaptable as public fishing piers.

This would be especially desirable when the installations are made at a State park—such as Sherwood Island, and in the case of Hammonassett State Park, Madisen, where the State, pending Federal approval, already has started construction in the Meigs Point section.

For several years the Bridgeport Saltwater Sports Association, the New Haven County League of Sportsmen's Clubs, and Connecticut Surfcasters, of which I am the organizer, have vainly tried to induce the State to build self-liquidating fishing piers at all three of our waterfront State parks, including Rocky Neck. It was our proposal that the cost would be met by imposing a use fee which also would provide funds for needed marine research.

When it became evident that Federal-State shore erosion control projects might in some cases take the form of pier-type breakwaters, we felt these could very well be adapted to use as public fishing piers at little or no extra cost. I originated a resolution, adopted first by Connecticut Surfcasters and more recently

by the New Haven County League of Sportsmen's Clubs, favoring this action. I might say here that the groups favoring this action have memberships aggregating 7,500 plus.

These piers would meet a year growing demand occasioned by the fact that more and more Connecticut residents, old and young, are turning to salt-water angling for sport and recreation. And, too, such piers would help relieve the steadily growing pressure upon Connecticut's meager inland angling facilities.

There are no public fishing facilities at any of our three State parks, although a dangerous breakwater at Rocky Neck is used by literally thousands of adults and children throughout the summer vacation months.

I do not write as the designated representative of any of the sportsmen's groups listed above, but as an individual who, as an outdoor writer has seen the need for these piers grow steadily during the past 30 plus years.

However, I do urge you to consider my suggestion as a valid representation of the beliefs of great numbers of your constituents, and that you initiate whatever affirmative action seems appropriate.

Respectfully,

CARL F. BISSELL.

CONGRESS OF THE UNITED STATES,
HOUSE OF REPRESENTATIVES,
Washington, D. C., April 19, 1955.

Hon. DENNIS CHAVEZ,
Chairman, Committee on Public Works,
United States Senate, Washington, D. C.

DEAR SENATOR CHAVEZ: I have this day requested that the enclosed data regarding construction of the proposed Palmer breakwaters become a part of the record of the current hearings of the Subcommittee on Flood Control, Rivers and Harbors.

I have discussed this plan with members of the Rhode Island and New York delegations concerned and trust that a survey of this project by Army engineers will be given a high priority due to its urgency, extensive constal coverage, and long-term economy.

Your cooperation in this matter will be greatly appreciated, I assure you.

Sincerely yours,

THOMAS J. DODD, *Member of Congress.*

STATEMENT BY REPRESENTATIVE THOMAS J. DODD, CONNECTICUT, TO SUBCOMMITTEE ON FLOOD CONTROL, RIVERS AND HARBORS OF THE SENATE COMMITTEE ON PUBLIC WORKS, APRIL 19, 1955

Between East Point, Fishers Island, N. Y., and Watch Hill Point, R. I., ocean waves sweep in directly from the Atlantic. Over a dozen reefs, many of which show above low tide, are scattered across this main access of erosive wave action to Connecticut, New York, and Rhode Island shores. Those residents who know this area best support a plan to construct protective breakwaters across this East Point-Watch Hill line, utilizing the reefs and shallows, leaving the deeper passages such as Lords and Watch Hill passages open to navigation.

This plan proposed by Mr. Henry R. Palmer, Jr., of Stonington, Conn., appears to merit serious consideration at this time. Apart from feasibility from an engineering viewpoint, the Palmer breakwaters would afford undisputed and urgently needed protection not only from hurricane-driven waters, but from the other storms which hit the area with a high degree of regularity. This system of breakwaters would protect lives and property within the entire Fishers Island Sound area extending along the coast from Watch Hill, R. I., to New London, Conn., and indirectly a much longer coastline.

Directly protected from Atlantic Ocean waves would be:

1. Watch Hill, R. I., and its harbor
2. Little Narragansett Bay
3. The Pawcatuck River and its valley
4. All land bordering north of Little Narragansett Bay
5. Stonington Borough and its harbor
6. Wamphassuc Point

7. Lord's Point
8. Mason's Island
9. Mystic River and Mystic, Conn.
10. Noank
11. Groton Long Point
12. Fishers Island and Fishers Island Sound

The proposed system of breakwaters would be beneficial for the following reasons:

1. To prevent a breakthrough of Napatree Point, anticipated by local seafaring people, which would permit Little Narragansett and the Pawcatuck River entrance to fill rapidly with sand;

2. To protect Stonington Harbor from ocean swells which roll into it continually during easterly winds, and to offer the harbor maximum protection during future hurricanes and the regular coastal storms;

3. To protect lights and other buoys in Fishers Island Sound from the severe damage regularly suffered by such devices during hurricanes;

4. To eliminate the need of a number of channel buoys which extend along the reefs between Fishers Island and Watch Hill;

5. To afford protection to the hundreds of sport fishermen who fish from early spring until late fall in the waters of Fishers Island Sound and Middleground off Napatree;

6. To eliminate wave action which is causing erosion throughout the entire area cited in paragraph above which suffers millions of dollars from hurricane damages and considerable heavy storm damages whenever they occur.

Such properties consist of private residences, commercial fishing piers, a 5-mile stretch of the New York, New Haven and Hartford Railroad right-of-way, a large plastics factory, two shipyards, the largest commercial fishing fleet in Connecticut, yachts and pleasure vessels, municipal beaches, State-owned property including a game preserve, the shellfish fishery, town and State and Federal roads, etc.

This proposal is made by no newcomer to the area in question. Mr. Palmer was born and brought up and earns his livelihood at Stonington, as his forebears did even before the town was founded in 1649. He knows whereof he speaks. His boatworks located on supposedly protected shores within Stonington Harbor have been severely damaged many times, virtually destroyed twice by hurricane-driven waters in recent years. The old harbor breakwaters no longer suffice. Even they have been damaged by wave action entering between Watch Hill and East Point, the site of the proposed new breakwaters.

This is a construction plan which benefits not Connecticut alone but Rhode Island and New York shores which the experts will confirm is suffering coastal erosion continually from that same source of direct Atlantic Ocean wave action. People unfamiliar with this southeastern corner of Connecticut do not realize that it is our only coastline unprotected by Long Island. I suggest that new construction of breakwaters first benefit the areas hit the hardest and most often.

FLOOD CONTROL—RIVERS AND HARBORS

THURSDAY, APRIL 21, 1955

UNITED STATES SENATE,
COMMITTEE ON PUBLIC WORKS,
SUBCOMMITTEE ON FLOOD CONTROL—RIVERS AND HARBORS
Washington, D. C.

The subcommittee met at 10:15 a.m., in room 412, Senate Office Building, Senator Robert S. Kerr (chairman of the subcommittee) presiding.

Present: Senators Kerr and Hruska.

Senator KERR. The hearing will proceed on S. 1318. First we will make the bill a part of the record, and also a letter from Acting Secretary of the Army Finucane, dated April 6, 1955, and a letter dated March 18, 1955, of Mr. Donald R. Belcher, Assistant Director of the Bureau of the Budget.

(The above-mentioned documents are as follows:)

[S. 1318, 84th Cong., 1st sess.]

A BILL To authorize construction of a highway crossing over Lake Texoma, Red River, Texas and Oklahoma

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the project for construction of a fixed highway bridge across Lake Texoma at or near the Willis site, Denison Reservoir, Red River Basin, Texas and Oklahoma, is hereby authorized: *Provided*, That the States of Texas and Oklahoma shall each contribute the sum of $606,000 toward the cost of the work contemplated under this Act.

SEC. 2. There are hereby authorized to be appropriated such sums as may be needed to carry out the provisions of this Act.

[S. 628, 84th Cong., 1st sess.]

A BILL To authorize construction of a highway crossing over Lake Texoma, Red River, Texas and Oklahoma

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the project for construction of a fixed highway bridge across Lake Texoma at the Willis site, Denison Reservoir, Red River Basin, Texas and Oklahoma, is hereby authorized substantialy in accordance with the recommendations of the Chief of Engineers contained in House Document Numbered 496, Eighty-third Congress, second session: *Provided*, That the States of Texas and Oklahoma shall each contribute the sum of $606,000 toward the cost of the work contemplated under this Act.

SEC. 2. There are hereby authorized to be appropriated such sums as may be needed to carry out the provisions of this Act.

DEPARTMENT OF THE ARMY,
April 6, 1955.

Hon. DENNIS CHAVEZ,
Chairman, Committee on Public Works,
United States Senate.

DEAR MR. CHAIRMAN: Reference is made to your request for the views of the Department of the Army with respect to S. 1318, 84th Congress, a bill to authorize construction of a highway crossing over Lake Texoma, Red River, Tex. and Okla.

The Department of the Army has considered the above-mentioned bill. The purpose of the bill is to authorize construction of a fixed highway bridge over Lake Texoma at or near the Willis, Okla., site. The bill provides that the States of Texas and Oklahoma shall each contribute $606,000 toward the cost of the work.

In 1942 the States of Texas and Oklahoma were each paid the sum of $606,000 for a perpetual flowage easement over such highways as would be inundated by the construction, maintenance, and operation of Denison Reservoir. The basis for the payments was the estimated cost of constructing a new bridge across Denison Reservoir at the Willis site in 1941 prior to impoundment of water in the reservoir. Because of the scarcity of critical materials due to the war, the construction of the crossing was not possible until 1946, at which time the site was permanently inundated and construction costs had increased substantially over those prevailing in 1941. To date, the bridge has not been constructed.

Your attention is invited to House Document 496, 83d Congress, which contains reports on a proposed highway crossing at the Willis site. The recommendation of the Chief of Engineers as set forth in that document was that an additional payment of $990,000 be made by the United States to the States of Texas and Oklahoma, $495,000 to each State, toward defraying the increased cost of constructing a bridge, based on 1946 conditions. Your further attention is invited to the position of the Bureau of the Budget as set forth in the document that no additional payment should be made. You will note that the Chief of Engineers, after further consideration, acceded to the position of the Bureau of the Budget and recommended that no additional payment be made. The Secretary of the Army concurred in this recommendation. Accordingly, the Department of the Army cannot recommend favorable action on S. 1318.

The cost of constructing the bridge under 1946 conditions has been estimated to be $2,619,000; however, present construction costs are about 1.8 times greater than in 1946 and the present total estimate would be approximately $4,700,000. Present Federal expenditures under S. 1318 would of course be reduced by the States' contribution of $1,212,000, the amount of the previous Federal payment. In the event of favorable action on S. 1318, it would appear that consideration should be given to increasing the States' participation by the amount of interest since 1942 on the $1,212,000 payments.

The Bureau of the Budget advised that there was no objection to the submission of a similar report on a similar bill, S. 628, and that enactment of S. 1318 would not be in accord with the program of the President.

Sincerely yours,

CHARLES C. FINUCANE,
Acting Secretary of the Army.

EXECUTIVE OFFICE OF THE PRESIDENT,
BUREAU OF THE BUDGET,
March 18, 1955.

Hon. DENNIS CHAVEZ,
Chairman, Committee on Public Works,
United States Senate.

MY DEAR MR. CHAIRMAN: This will acknowledge your letters of January 24, and March 5, 1955, requesting the views of the Bureau of the Budget on S. 628 and S. 1318, bills "to authorize construction of a highway crossing over Lake Texoma, Red River, Tex., and Okla.

It would appear that the purpose of the bills is to provide for Federal construction of a bridge over Lake Texoma at the Willis, Okla., site, the bridge to be of the type referred to in House Document 496, 83d Congress. The bills provide that the States of Texas and Oklahoma shall each contribute $606,000 toward the cost of the work.

In commenting on the report of the Chief of Engineers contained in House Document 496, the Bureau of the Budget advised the Secretary of the Army that there was no known legal justification for additional payments by the United States to the States of Texas and Oklahoma toward such a bridge; and further that such payment might be construed as admitting liability for damages caused by the materials priority system established during time of emergency and could thus establish a precedent, the far reaching effects of which could not be evaluated at this time. Accordingly, the Bureau of the Budget advised the Secretary of the Army that authorization of the proposed payments would not be in accord with the program of the President. The Secretary of the Army, in

his report to your committee on S. 628, states that the Chief of Engineers acceded to the position of the Bureau of the Budget, and recommended that no additional payment be made. The Secretary states further that he concurred in that recommendation, and concludes that the Department of the Army cannot recommend favorable action on S. 628.

The Bureau of the Budget is fully in agreement with the views contained in the report of the Secretary of the Army on S. 628. Enactment of S. 628 or S. 1318 would not be in accord with the program of the President.

Sincerely yours,

DONALD R. BELCHER, *Assistant Director.*

Senator KERR. The first witness this morning is a representative of the Corps of Engineers, Joseph R. Brennan.

STATEMENT OF JOSEPH R. BRENNAN, CHIEF OF THE PROJECT DEVELOPMENT BRANCH, CIVIL WORKS DIVISION, CORPS OF ENGINEERS, DEPARTMENT OF THE ARMY

Mr. BRENNAN. Mr. Chairman, I am J. R. Brennan, I am with the Civil Works Division of the Corps of Engineers.

Senator KERR. Please have a seat and give your statement.

Mr. BRENNAN. Mr. Chairman, the bill S. 1318, which is before the committee for consideration would provide for authorization of construction of a highway crossing over Lake Texoma at the so-called Willis site.

The bill provides that the States of Texas and Oklahoma shall each contribute $606,000 to the cost of this bridge. The $606,000 is a sum which was paid to the States earlier by the Federal Government.

Senator KERR. In about 1941, I believe.

Mr. BRENNAN. It was in 1942 that the payment was actually made. The agreement, however, was made in 1941.

The payment was made for damages caused by the abandonment of the roads in Lake Texoma, particularly the road which is known as Oklahoma Highway 99 and Texas Highway 91.

With your permission, sir, I would like to sketch briefly how I propose to present this testimony in the event that you may wish a different presentation.

Senator KERR. You make your presentation in the manner that you desire and then we will discuss it if I feel that a discussion would be beneficial to the record.

Mr. BRENNAN. Thank you, Mr. Chairman. I plan to describe the project briefly, to indicate how the problem arose, and to trace very briefly the events which have occurred in efforts to find a solution.

Lake Texoma is formed by the construction of Denison Dam, a multipurpose structure, authorized by the Flood Control Act of June 28, 1938.

Construction of the project extended over the period from 1939 to 1949, but the dam was substantially completed and the embankment closed in the period from July 1942 to October 1943; impoundment of the power pool started in January 1944, and was completed in March 1945.

The first commercial power generation was started in March 1945. The project is now approximately 90 percent complete.

The cost of the project is estimated at $66 million. The purposes of the project are the generation of hydroelectric power, flood control for

lands along the Red River in Oklahoma, Louisiana, Arkansas, and Texas, navigation, and river regulation. The drainage area behind the dam is 39,000 square miles.

The amount of storage is 5,700,000 acre-feet, of which about 3 million acre-feet is for power and accumulation of silt, and 2,700,000 acre-feet is for flood control.

The dam is an earth structure approximately 165 feet high, and about 15,200 feet long. The total area at the top of the power pool is 93,000 acres, and at the top of the flood-control pool, 142,700 acres.

There are 2 hydroelectric generating units in operation with a capacity of 70,000 kilowatts, and the ultimate installation will be 3 more with a total capacity of 175,000.

When the project was constructed, the problem of relocations of roads, highways, railroads, and utilities arose. In that connection the crossing at the so-called Woodville Bridge, which was about 10 miles above the dam, posed something of a problem.

The Woodville Bridge joined Texas Highway 91 and Oklahoma Highway 99.

Senator KERR. Is that as shown on this map here?

Mr. BRENNAN. It is as shown on that map, sir. The problem of evaluating the damage, or the payment, which should be made for that road was a difficult one, and the solution was found in estimating the cost of a highway crossing at another site some 20 miles upstream at the location known as the Willis site.

An estimate of the cost of constructing a bridge at the Willis site was $1,212,000. In the negotiations among the Federal Government and the States of Texas and Oklahoma in connection with the relocations at other points and in connection with the abandonment of the Woodville road, agreement was reached that the payment of $1,212,000, which represented the cost of constructing a bridge at the Willis site, would be adequate compensation for the abandonment of the Woodville road.

Senator KERR. Has there ever been an estimate made of what it would have cost to have built the structure across the lake at the Woodville site?

Mr. BRENNAN. I am not certain, Mr. Chairman. There may have been, but I do not have that figure in mind. I can supply that for the record.

Senator KERR. Would you do this, also in the event such an estimate was not made, would you give us, not a carefully calculated one, but what you would regard as a fairly accurate general estimate of what such a structure would have cost?

Mr. BRENNAN. I will be glad to do so, sir.

Senator KERR. Fine. Thank you.

(The requested information follows:)

A bridge at the Woodville site would have cost $2,100,000.

Mr. BRENNAN. The cost of the crossing at the Willis site was based upon construction under dry conditions with no water in the lake. Unfortunately, the situation which arose because of the critical materials shortage, shortly after the agreement was made among the States and the Federal Government, resulted in inability of the States to secure critical materials, particularly steel.

Senator KERR. Which resulted in their inability to build the bridge.

Mr. BRENNAN. Yes, sir.

Senator KERR. At that time.

Mr. BRENNAN. That is correct, sir.

Senator KERR. Through no fault of their own.

Mr. BRENNAN. That is correct, sir.

Senator KERR. And through no fault of the Federal Government.

Mr. BRENNAN. That is also correct, sir.

Senator KERR. The Army engineers actually tried to use what priority rights they had to get the steel to build it; did they not?

Mr. BRENNAN. That is correct, sir. The Corps of Engineers tried several different ways of assisting the States in building a bridge, but it was not possible to do so.

In the meantime, during the critical material shortage the lake was being formed by the construction of the dam, so that when the critical materials situation was over, in November of 1945, the site was actually flooded, and, therefore, the cost of constructing the bridge would have been considerably greater.

The amount that it would have been greater is estimated on the basis of 1941 prices as $700,000.

Senator KERR. Additional?

Mr. BRENNAN. Additional, which would have made the cost of the bridge in 1946, based on 1941 prices, a total of $1,912,000.

Senator KERR. Is there the slightest possibility that in 1946 materials could have been secured at 1941 prices?

Mr. BRENNAN. No, there was no possibility of that. The cost of the bridge in 1946 would have been the cost as of 1941 escalated to 1946 prices, and including consideration of an extra amount required to build the bridge under wet conditions.

That escalation was made, sir, and the total cost of the bridge in 1946, based on 1946 prices, which were 1941 prices escalated to that date, was $2,619,000.

That figure of $2,619,000 represents the actual cost of the bridge in 1946, including the additional cost for constructing it in the wet.

I shall develop that figure one step further, sir, at that point by stating that in making a payment or in arriving at a possible equitable settlement, consideration must be given to the interest which had accrued from the sum of $1,212,000 paid to the States in 1942 so that if that interest, accumulated to the period in which the study was being made, which happened to be 1952, is subtracted from $2,619,000, it would leave a total balance of $900,000, excluding the $1,212,000 originally paid.

In other words, in addition to the $1,212,000 originally paid to the States, the cost of building a bridge in 1946 would have been $990,000 more with the proper adjustment for accrued interest to a later date.

Senator KERR. I did not understand you maybe. Did you say the amount of interest that was included in that claim was for the period up to 1946 or up to 1952?

Mr. BRENNAN. 1952, sir. I used that date because later I will explain that the report which was made by the Corps of Engineers in response to a later resolution was based on studies made in 1952.

Senator KERR. But, of course, if the bridge had been built in 1946 and the $1,212,000 used in the construction, it would have ceased to be in the posture of being able to bear interest, would it not?

Mr. BRENNAN. That is correct, sir. If we were to have made a study in 1946, then the interest which should be subtracted would be the interest between 1942 and 1946. The only reason for the additional amount is that the study was made at a later time and interest had accrued to that time.

Senator KERR. Off the record.

(Thereupon, there was a discussion off the record.)

Mr. BRENNAN. Mr. Chairman, as a result of requests by local interests, and particularly the States involved, resolutions were introduced, in 1949 and in 1950, to require the Corps of Engineers to make a review study.

That study was made, and it culminated in a report by the Board of Engineers for Rivers and Harbors on the 18th of November 1952.

It is in that report where the recommendation was made that an additional amount of $990,000 be paid, divided equally between the two States, on the reasoning that I have given earlier in my testimony.

The report was submitted, went through its usual processing and eventually went to the Bureau of the Budget. The Bureau of the Budget replied to the Secretary of the Army and stated its position with respect to the recommendations in the report.

I would like, Mr. Chairman, to read the particular part which states the Bureau of the Budget's position, because I think it is important to have it precisely stated.

Senator KERR. That is on page 3 of this document No. 496, I believe.

Mr. BRENNAN. That is correct, sir.

Senator KERR. All right.

Mr. BRENNAN. This is contained in a letter from the Bureau of the Budget to the Secretary of the Army dated April 30, 1954, and is printed in House Document No. 496, 83d Congress, 2d session:

This Bureau—

meaning the Bureau of the Budget—

knows of no legal justification for additional payments by the United States to the States of Texas and Oklahoma. Payments totaling $1,212,000 were made over highways in the reservoir area by the States. The States claim that contractual obligations arising from the granting of perpetual flowage easements over highways in the reservoir area by the States. The States' claim that construction of the bridge as originally contemplated was delayed because of the priorities system of the War Production Board does not, in our opinion, establish further liability on the part of the United States. It is stated in the report that construction of the bridge was not a condition of the contracts in which the States granted flowage easements to the United States. Furthermore, additional payment by the United States in this instance might be construed as admitting liability for damages caused by the materials priority system established during time of emergency and could thus establish a precedent, the far-reaching effects of which cannot be evaluated at this time.

In considering the comments of the Bureau of the Budget, the Chief of Engineers studied the matter very carefully and recommended that the position of the Corps of Engineers be changed in view of the comments of the Bureau of the Budget.

The Secretary of the Army in forwarding the report to the Congress stated that he had asked the Chief of Engineers to give further consideration to this matter in the light of the comments of the Bureau of the Budget and that the Chief of Engineers had advised him that in view of the responsibility of that Bureau in formulating

the policies of the executive branch of the Government concerning relief legislation, he accedes to the position it takes and, therefore, the recommendation for additional payment, Mr. Chairman, was in effect withdrawn.

That concludes, Mr. Chairman, my specific presentation unless there are some questions.

Senator KERR. Mr. Brennan, I want to thank you for a very fair and very comprehensive statement to the committee.

What I am wondering about though is that when the engineers considered this matter on the merits, they recommended the payment of a sum of money which they calculated to be the amount over and above the $1,212,000, which would have been required to build the bridge in 1946, less an amount they calculated to have been the interest accrual on the $1,212,000 from the time it was paid until 1952.

Mr. BRENNAN. Yes, sir.

Senator KERR. That recommendation of the Army engineers was first made public on August 17, 1954. I have before me House Document 496—I beg your pardon it was first made known December 9, 1953. That seems to be contained in the first paragraph of the letter from the Bureau of the Budget, a part of which you read into the record.

Mr. BRENNAN. Mr. Chairman, I believe that we could consider that the recommendation was made public at the time the Board of Engineers for Rivers and Harbors completed its report on November 18, 1952; in other words, the information was available then.

Senator KERR. In November, 1952?

Mr. BRENNAN. Yes, sir.

Senator KERR. The change in the position of the engineers was brought about solely by the directive of the Bureau of the Budget?

Mr. BRENNAN. The only change in the situation, the only additional consideration that was involved between the time of the original recommendation and the time of the final recommendation was the policy matter as stated in the Bureau of the Budget's letter.

Senator KERR. There has been no reconsideration or review of the facts in the matter by the engineers or the merits of the case from their viewpoint since the announcement of their decision in November 1952?

Mr. BRENNAN. No, sir; there has not been.

Senator KERR. I believe that is all the questions I have. Do you have any questions, Senator?

Senator HRUSKA. Just this, Mr. Brennan: It is not within your province or your knowledge, but has there been any other instance where the delay on account of the War Production Board restrictions has been recognized as a basis for making similar adjustment like this?

Mr. BRENNAN. I know of no precedent, sir, insofar as the Corps of Engineers is concerned, that would be similar to this case. I cannot speak for other agencies of the Government or other activities that might have been affected in the same way.

Senator HRUSKA. Your testimony is confined to your knowledge of the Corps of Engineers and its activities, is that right?

Mr. BRENNAN. Yes, sir.

Senator HRUSKA. I notice in the report of August 17, cognizance is taken that the contracts between the States and the United States

did not require construction of a bridge and that, of course, is part of the basis for the Bureau of the Budget's letter of April 30, 1954. Why, I am just curious, in view of the fact that the construction wasn't required and no conclusion was reached by your Corps of Engineers at that time, or by the Department of the Army, was the shift made at a later time?

That element was the same in both instances, was it not?

Mr. BRENNAN. Yes, sir; there was no change in that element, and I might say that the original contract was based upon a payment for damages resulting from the abandonment of the original route, and the cost of the proposed new crossing was merely a method of estimating the amount of the payment by the United States—and it was not contemplated in the agreement that it would participate in or intend to participate in the construction of any bridge crossing.

That was left entirely to the States and if they had chosen some other method of dealing with the traffic problem, then that would have been within the province of the contract.

To answer your question on the matter of the budget letter, as I said earlier, the only change in the situation was the expression by the Bureau of the Budget of a policy which extended beyond the Corps of Engineers to the country as a whole and in which the Chief of Engineers felt he should fit the problem of the Willis crossing.

Senator HRUSKA. And the chief element of which was the establishment of a precedent which would have tremendous impact one way or another?

Mr. BRENNAN. That is right.

Senator HRUSKA. That is all, Mr. Chairman.

Senator KERR. $1,212,000 was fixed as the amount of damages after it was determined that that would be the cost of building a bridge at the Willis crossing?

Mr. BRENNAN. Yes, Mr. Chairman.

Senator KERR. And it was a great favor to the Federal Government to figure the amount necessary to build a bridge at the Willis crossing instead of at the place where the old bridge was because the water at the Willis crossing would be about 15 percent as wide as it would have been had they been required to replace the crossing where the crossing was?

Mr. BRENNAN. It would have been, Mr. Chairman, more expensive to have built the bridge at the site of the original bridge crossing.

Senator KERR. By many times?

Mr. BRENNAN. That figure, sir, is the one that I am going to supply for the record.

Senator KERR. As you look at this map and realize that the water is much deeper close to the dam where the old Woodville crossing was than it is at the Willis crossing and several times as wide, the conclusion that the cost would have been many times more is inevitable, is it not?

Mr. BRENNAN. It would have been considerably more, sir. I hesitate to use "many" because——

Senator KERR. But you are going to make a rough calculation of that and give us the benefit of your findings on it?

Mr. BRENNAN. Yes, sir.

Senator KERR. There was no other thought either in the minds of the engineers or of the States but that the amount agreed upon was

the amount which would have been sufficient to build the bridge at the Willis crossing, is that not right?

Mr. BRENNAN. That is correct, sir.

Senator KERR. Would you tell us then what rate interest was figured by the Rivers and Harbors Board when they made their calculation in November 1952?

Mr. BRENNAN. It is based on 3 percent interest.

Senator KERR. Compounded?

Mr. BRENNAN. Yes, sir.

Senator KERR. Senator Hruska asked you if you knew of any precedent where the Government as acted in a situation similar to this. Do you know of any other case where between the time an agreement was made and the time the money was paid in a case of this kind that the States were unable to do that which was calculated they would do by reason of the national emergency and the resultant unavailability of the materials required for the contemplated project?

Mr. BRENNAN. No, sir. From my own experience, and confining my answer to the Corps of Engineers, I know of no case where there was a payment made to States for the construction of a facility which was prevented by the critical materials shortage, resulting in a further cost to the States.

Senator KERR. The predicament in which the States have found themselves from the time this $1,212,000 was paid down to this time with reference to the additional cost over and above that which the Federal Government paid them was solely by reason of the national emergency and the resulting unavailability of the critical materials?

Mr. BRENNAN. Yes; and including the construction of the lake which increased the cost of the crossing.

Senator KERR. The Federal Government was not to blame for that, was it?

Mr. BRENNAN. No, sir.

Senator KERR. And neither were the States, were they?

Mr. BRENNAN. No, sir.

Senator KERR. One of the two—that is, either the Federal Government or the States if this bridge is built—will have to bear the burden of the additional cost, will they not?

Mr. BRENNAN. Yes, sir.

Senator KERR. If the engineers and the States had known at the time that the bridge which they both contemplated would be built with the money that was to be paid and which was paid could not be built, the engineers would have made the contract with the States that would have saved them whole, would they not?

That is the law, is it not, Mr. Brennan?

Mr. BRENNAN. Yes, sir; they would have arrived at some other measure of the cost.

Senator KERR. It is the law that where a project of this kind causes the replacement of highways and even railroads or railroad bridges that the cost of replacement is the measure of the amount which the Government pays either to the States or to the owners of private property?

Mr. BRENNAN. Yes, sir.

Senator KERR. That is the measure?

Mr. BRENNAN. Yes, sir.

Senator KERR. I believe that is all, Mr. Brennan, unless the Senator has some other questions.

Senator HRUSKA. I have one other question, Mr. Chairman. You suggested, in answer to Senator Kerr's question, that if these circumstances which actually did follow had been anticipated at the time the settlement was arrived at, that allowance would have been made for same.

Mr. BRENNAN. Senator, I believe I said that another method of evaluating the payment would have been used, probably. If the highway crossing at Willis could not have been built, and if that had been known, the cost of a crossing there would not have been the basis of evaluating the damage to the States.

Senator KERR. That is the cost which you would arrive at?

Mr. BRENNAN. Yes, sir. Some other method would have had to be used to determine what a fair and equitable payment would have been.

Senator HRUSKA. Would it have embraced the element of increased cost because of unavoidable delays occasioned by War Production Board's restrictions?

If it did, then you would have anticipated the establishment of a precedent 'way back there instead of waiting until after the fact, is that not true?

Mr. BRENNAN. I think, sir, that the method that would have been used probably would have been the damage to the States by reason of destroying the crossing, the damage being measured in terms of the losses to traffic which would have to be detoured around the lake.

We made no attempt to explore any other ways of measuring the damage, but in all possibility it would have been to measure the cost and inconvenience for the extra distance traveled by the traffic.

Senator HRUSKA. So that when you say another method would have been resorted to, it would not necessarily have been the method that is requested in this bill; namely, compensating for that difference in construction cost occasioned by this delay of War Production Board restrictions?

Mr. BRENNAN. It might not have been the method contemplated in this bill.

Senator KERR. But in the absence of an agreement otherwise, the responsibility would have been on the Corps of Engineers to replace the bridge over the lake at Woodville, would it not?

Mr. BRENNAN. The responsibility, sir, would have been to make the States whole.

Senator KERR. With reference to their transportation facility at that point?

Mr. BRENNAN. It would depend, sir, on whether the States insisted on highway crossing at that point.

Senator KERR. I say in the absence of an agreement.

Mr. BRENNAN. In the absence of an agreement, it would have been required that the Federal Government make the States whole.

Senator KERR. If there had been a railroad bridge across there, you would have either had to build a new bridge over the lake at that point or replace it with a facility that would have made the railroad whole with reference to what they were giving up; would you not?

Mr. BRENNAN. Or for the third possibility, to have paid the railroad a monetary sum which they might have accepted or been willing to take.

Senator KERR. That they would have agreed to?

Mr. BRENNAN. That is right, sir; a damage payment rather than a contract for replacement.

Senator KERR. But in the absence of an agreement by them to that extent, the law puts the responsibility on the Government to replace the facility with a usable facility; does it not?

Mr. BRENNAN. I believe, sir, that the law requires a payment to compensate, to make the States whole.

Senator KERR. Let me ask this question: Could you put a railroad out of business in the absence of an agreement by them to that effect merely by building a dam upon a stream where they have got a right-of-way and a crossing?

Mr. BRENNAN. Sir, we might have to relocate the railroad around the reservoir and pay that extra cost.

Senator KERR. The Government pays that extra cost?

Mr. BRENNAN. The Government would pay the extra cost or whatever the railroad established as a damage.

Senator KERR. In the absence of an agreement to accept monetary damages, the law puts upon you the burden of replacing that facility with a usable facility?

Mr. BRENNAN. If by "facility" you mean any kind of facility, then I think that is correct.

Senator KERR. One that is usable and of equal usefulness to the one you eliminate?

Mr. BRENNAN. That would include, of course, the relocation of the new road around the entire lake and then possibly a payment to the States for the extra distance traveled.

Senator KERR. And that is often done, is it not?

Mr. BRENNAN. Yes, sir; that is in fact a common way.

Senator KERR. It is the spirit of the law to regard that expense as a part of the cost of the project; is it not?

Mr. BRENNAN. Yes, sir.

Senator KERR. And neither the engineers nor the highway departments knew that they were going to be unable to build that bridge immediately upon payment of that money, did they?

Mr. BRENNAN. That is correct, sir.

Senator KERR. This other emergency came upon them and the critical material shortage brought about by action of the Government because of that emergency that arose and with reference to which neither of them knew it was going to arise?

Mr. BRENNAN. Yes, sir.

Senator KERR. That is all.

One other question, Mr. Brennan—and again I want to thank you for your very fair and accurate statement—at the same time that the State might have been drawing interest on this $1,212,000, they were also deprived of the use of the bridge; were they not?

Mr. BRENNAN. Yes, sir; they were deprived of the use of Highway 99.

Senator KERR. They lost the use of the Woodville bridge, did they not?

Mr. BRENNAN. Yes, sir.

Senator KERR. And it was impossible for them to build and use the Willis bridge?

Mr. BRENNAN. Yes, sir.

Senator KERR. All right.

Senator HRUSKA. The record refers to the 1941 contract executed between the United States and the States of Texas and Oklahoma; are those too voluminous but what we could have access to them for our inspection?

Mr. BRENNAN. I have copies of them right here.

Senator KERR. Would the Senator like to have them in the record?

Senator HRUSKA. Yes; I think that would be helpful.

Mr. BRENNAN. They are the official signed copies.

(Thereupon, there was a brief off-the-record discussion.)

Senator KERR. I would suggest that Mr. Brennan make copies of them available to the committee, and then if any members of the committee want copies in the record, we will put them in at that time.

Senator KERR. At this time I believe Congressman James Wright of Texas has come in and we will hear him.

Congressman Wright.

STATEMENT OF HON. JAMES H. WRIGHT, REPRESENTATIVE IN CONGRESS FROM THE 12TH DISTRICT OF THE STATE OF TEXAS

Mr. WRIGHT. It would have been perfectly allright if I had simply filed a statement and I do not want to intrude on your time.

Senator KERR. We do not regard it as an intrusion at all, Congressman Wright. We are glad to have you.

Mr. WRIGHT. I will be as brief as possible and I do appreciate this opportunity, of course, to appear before you and testify in behalf of your bill.

Senator KERR. Would you like your prepared statement put into the record, Congressman?

Mr. WRIGHT. I would, Mr. Chairman.

(The statement of Congressman Jim Wright is as follows:)

It is a distinct pleasure for me to appear before this committee and to testify briefly in behalf of this bill.

It would not be completely honest for me to leave you with the impression thate the interest of my constituency in the authorization of this project were completely devoid of the expectation of indirect benefits. Admittedly, although the nearest point in my district is removed by almost 75 miles from the proposed site, the reopening of this gate to the flow of traffic and commerce will unquestionably redound to the advantage of Fort Worth and points still farther removed.

I can assure you in all honesty, however, that my people regard the fundamental issue at stake to be a principle infinitely more important than the convenience of a motorist or the economic advantage of a city.

The issue involved is the opportunity which this bill affords for our Federal Government to keep faith with two of its member States which were deprived of a valuable property by a series of events directed in whole by the Federal Government in the exercise of its rightful power * * * events over which neither of the States had the slightest measure of control.

The essential facts, briefly recapitulated, are as follows: When the Red River dam at Denison was under construction, it was known that this particular length of highway and the bridge by which it crossed the river would be inundated.

Accordingly, the highway departments of Texas and Oklahoma called upon the United States Government to finance the replacement of the facility. This responsibility was acknowledged, and after many months of negotiation, the Federal Government agreed in December of 1941 to pay the sum of $1,212,000, to be divided equally between the two States. This amount was at the time considered adequate to perform the necessary work.

Definite plans were begun for the construction of the bridge between Willis, Okla., and Gordonville, Tex. Meanwhile, our entry into World War II had brought about priority controls of structural steel, and the quantity of this material necessary to complete the bridge was denied by the Federal authority. Yet the dam was not stopped. The area was flooded and the facility lost. Both States were prepared to build this bridge, and it would have been erected at that time had not the necessary materials been made unprocurable by Federal order.

The States are still ready to build the bridge. Their need for replacing the structure and their anxiety over the problem have mounted with each succeeding year. Obviously, the sum of money necessary to accomplish this task prior to the inundation of the vast area now underwater, is today totally inadequate to do the job. Not only is the cost of underwater construction many times greater than the cost of land-based construction, but as all of us are fully aware the price of building materials has skyrocketed in the intervening years.

So far as I know, no responsible party has challenged the right or the wisdom of our Government in exercising the policies which have created this problem. Surely no one maintains that the Government has been wilfully capricious. Yet the fact remains that the predicament was created by the policies of the Federal authority, and in simple fairness it can be no less than a Federal responsibility to set matters aright.

There can be no possible question whatever of a "give away" or an unnecessary boon accruing to either of the States through the passage of this legislation. There is ample precedent in the assumption of Federal obligation in such matters by previous actions of the Congress. The present bill calls for the expenditure only of those funds necessary to construct the bridge. It further requires that the two States contribute all of what they received in 1941 to the completion of the task, and they stand ready and completely willing to do so.

It seems extremely unfortunate that 12 years should have been permitted to elapse without a solution to this problem. I congratulate your committee upon having taken up the consideration of this bill at this time, and I sincerely hope that it may be promptly enacted.

Mr. WRIGHT. I do not think there can be any remote question, Mr. Chairman, of giving away of an unnecessary boon to either of the States. I think it is drawn with an eye to conserving the Federal Government's funds inasmuch as it requested expenditures only of those funds that are absolutely necessary to the completion of the dam—and since it is the obligation of the States to contribute the whole of what they received in the initial agreement to the completion of the task, and it is my understanding that both of the States are completely willing and anxious to contribute that sum and to go ahead with the completion of the bridge that was destroyed by the inundation of this area, I think it is a proper and reasonable expenditure.

I think it is probably very unfortunate that the situation has gone these many years without completion. I congratulate your committee upon having taken it up at this time, and I honestly hope that the bill may be enacted without undue delay.

Senator KERR. Thank you very much, Congressman Wright. I appreciate what you said about the principle. I take it you refer to the principle of good faith.

Mr. WRIGHT. I do, sir.

Senator KERR. You do not then subscribe to the wholesomeness of an attitude that if there is a technicality making it possible for the Federal Government to avoid an obligation to two of its States, that it is acting as a government according to our concepts of it by taking advantage of the technicality to avoid meeting its obligation?

Mr. WRIGHT. No, I do not. I do not think that is the spirit of the agreement as it was entered into, and I do not thing it is the spirit which should pervate the activities of the Federal Government.

I think in good faith we can only recognize that this situation was created in part as a result of that Federal jurisdiction and Federal authority and having created the situation, I think it can be no less than a Federal responsibility morally to its member States to go ahead and create the settlement and a satisfactory solution to the problem.

Senator KERR. Having created the technicality, you think it would not be wholesome for them to hide behind that which both the Federal Government and the States thought they were taking care of?

Mr. WRIGHT. You expressed it very well and expressed my sentiments exactly, sir.

Senator KERR. Do you have any questions?

Senator HRUSKA. No, Mr. Chairman.

Senator KERR. Senator Monroney?

Senator MONRONEY. No, sir.

Senator KERR. Senator Monroney, did you want to make a statement?

Senator MONRONEY. I would be glad to wait.

Senator KERR. Then at this time we will hear Mr. Floyd D. Peterson representing the Bureau of the Budget.

STATEMENT OF FLOYD D. PETERSON, ASSISTANT CHIEF, RESOURCES AND CIVIL WORKS DIVISION, BUREAU OF THE BUDGET, EXECUTIVE OFFICE OF THE PRESIDENT

Mr. PETERSON. My name is Floyd D. Peterson, Assistant Chief, Resources and Civil Works Division, Bureau of the Budget.

I have no statement to present to the committee. I believe the Bureau's views have already been set forth by Mr. Brennan as they are contained in our letter of April 30, 1954, to the Secretary of the Army, and the letter to the chairman of the Senate Public Works Committee on March 18, 1955.

Senator KERR. Thank you, Mr. Peterson. We want to express our appreciation to you for coming here. I take it that the action by the Bureau of the Budget is one which they feel they have been compelled to take not because of lack of a feeling on their part that there is merit to this bill from the standpoint of equity and justice, but because they feel that if they gave a letter approving it, they might be establishing a dangeous precedent with reference to liabilities, the extent of which they do not know and they feel they could not at this time allow?

Mr. PETERSON. Yes, Senator, that is the opinion of our attorneys.

Senator KERR. In order to avoid taking a position that might be a precedent that would be quite expensive, you feel that from the standpoint of watching and guarding against such development, you are impelled to withhold approval of this bill?

Mr. PETERSON. Our comments, sir, have nothing to do with the approval of the bill, as you know. Our comments were merely the letter on the report of the Corps of Engineers in reference to the bill. What the final decision would be on any bill, of course, only the President can decide.

Senator KERR. You are speaking now for the budget?

Mr. PETERSON. Yes, sir.

Senator KERR. Which, as I understand it, directed the Corps of Engineers to change their recommendation and which wrote to the chairman of this committee stating that—

such payment might be construed as admitting liability for damages caused by the materials priority system established during time of emergency and could thus establish a precedent, the far-reaching effects of which could not be evaluated at this time. Accordingly the Bureau of the Budget advised the Secretary of the Army that authorization of the proposed payments would not be in accord with the program of the President.

Mr. PETERSON. Yes, sir; that was our statement, sir; but it was not a direction to the Corps of Engineers. It was merely advice which we usually give to the corps.

Senator KERR. Did it leave them any discretion in the matter?

Mr. PETERSON. Yes, sir.

Senator KERR. They could have ignored this advice and continued to recommend the payment of money, if they so desired?

Mr. PETERSON. Yes, sir.

Senator KERR. How long would they survive in that kind of an environment?

Mr. PETERSON. I think you will find, Senator, that there are many reports at least a number of reports, where the advice given by the Bureau of the Budget and the recommendation of the Secretary of the Army are not exactly the same.

In other words, our function is merely to advise the Chief of Engineers and the Secretary of the Army as to the position of the President; and they are free to make any recommendation they see fit.

Senator KERR. Let me say to you, Mr. Peterson, that I have the highest regard for you and your department, and any questioning I may indulge in here is for the development of fact and not for the purpose of engaging you in controversy, but you do feel that the development of facts is wholesome, do you not?

Mr. PETERSON. It certainly is, and it is one of the policies we try to follow, sir.

Senator KERR. I wonder if you would give the committee a list of projects that the Army engineers have continued to recommend in the last 2 years and some months, since January 1953, after receiving an advice from the budget that the projects were not in accordance with the program at the present.

Mr. PETERSON. I would be glad to do so.

(The requested information follows:)

LIST OF PROJECTS OF ARMY ENGINEERS

The list of projects which the Army engineers have continued to recommend after receiving advice from the Bureau of the Budget that the projects or parts of the projects were not in accord with the program of the President as recommended (January 1953 through March 1955) is as follows:

Port Aransas–Corpus Christi Waterway, Tex.
Holland Harbor and Black Lake (Lake Macatawa), Mich.
Buffalo Bayou and tributaries, flood protection for Houston, Tex.
Rogue River Harbor at Gold Beach, Oreg.
Mississippi River-Guttenberg, Iowa, to Hamburg Bay, Ill.
Cumberland River, Ky. and Tenn.
Columbia River at the mouth, Oregon and Washington.
Playa del Rey Inlet and Basin, Venice, Calif.
Port Washington Harbor, Wis.
Greys Harbor and Chehalis River, Wash.

Richmond Harbor, Calif.
Water levels of the Great Lakes, local flood-protection projects.
Rio Hondo at Roswell, N. Mex.
Tillamook Bay and Bar, Oreg.
White River and tributaries, Missouri and Arkansas.
Red River and tributaries, Texas, Oklahoma, Arkansas, and Louisiana.
Flood control, Mississippi River and tributaries with respect to Old River control.
Richland, Chambers, and Cedar Creeks, Tex.
West Branch, Susquehanna River.
San Lorenzo River, Calif.

Senator KERR. I would like to ask you this question: Do you think that the building of a bridge by the Government, with the States contributing the amount of the money which the Government itself gave them at a time when both the Government and the States thought it would be adequate to build the bridge, but it could not be built because of our national emergency and orders of the Federal Government, would have a far-reaching effect?

Mr. PETERSON. We have not gone into any moral obligations, Mr. Chairman.

Senator KERR. I am not talking about that. I would like for you to give me your judgment of how far reaching that would be as a precedent, and as the basis for creating future liability for the Government.

Mr. PETERSON. In discussing this with our attorneys, they pointed out to me that we must agree that final settlements are final settlements.

Senator KERR. Even though they cannot be implemented by reason of actions of one of the parties?

Mr. PETERSON. I did not discuss that, Senator.

Senator KERR. What was the $1,212,000 paid to the States for, Mr. Peterson?

Mr. PETERSON. According to the report, it was for the purpose of a flowage easement.

Senator KERR. Do you believe the statements by Mr. Brennan that it was agreed on as the amount necessary to build the crossing at Willis?

Mr. PETERSON. That is my understanding of the way it was computed.

Senator KERR. And that the money was to be used for that purpose?

Mr. PETERSON. According to the statements in the report, that is correct, sir.

Senator KERR. Do you doubt them?

Mr. PETERSON. No, sir.

Senator KERR. Would you indulge the assumption that they are correct?

Mr. PETERSON. I have no reason to believe that they are not correct, sir.

Senator KERR. Would you then indulge the assumption that they are correct?

Mr. PETERSON. They probably are correct, sir.

Senator KERR. You are aware of the fact that that bridge could not be built because of the actions of one of the parties to this agreement; are you not?

Mr. PETERSON. That is my understanding.

Senator KERR. Do you have the slightest doubt of the accuracy of that statement?

Mr. PETERSON. No, sir.

Senator KERR. The Federal Government was big enough to make that order; was it not?

Mr. PETERSON. Yes, sir.

Senator KERR. And the States were bound by it, were they not?

Mr. PETERSON. Yes, sir.

Senator KERR. And prohibited from carrying out that agreement by reason of those orders of the Federal Government, were they not?

Mr. PETERSON. That is my understanding.

Senator KERR. Do you have any feeling that the failure of the Government thereafter to make two of its member States whole by reason of damage they sustained merely by complying with war emergency orders of the Federal Government would be precedent of some significance one way or another?

Mr. PETERSON. According to our attorneys, sir, it would be.

Senator KERR. I think it would be too, and I wonder if you understood my question. I asked you if the Federal Government refused to make one of its member States whole by reason of damage it suffered in obeying mandates of the Federal Government would not be a precedent of some sort.

Mr. PETERSON. I have no way of knowing that, sir. I have no knowledge of course that would come under that category.

Senator KERR. Are you not able to respond or are not permitted to respond?

Mr. PETERSON. I am not familiar with that.

Senator KERR. I asked you for your opinion if that would not be some kind of precedent.

Mr. PETERSON. I have no way of knowing.

Senator KERR. I did not ask you if you knew. I asked you your opinion if you thought that might create the possibility of a precedent.

Mr. PETERSON. I just would not know.

Senator KERR. Aside from precedent, Mr. Peterson, do you think that there is any moral obligation here?

Mr. PETERSON. As I mentioned, sir, we have not gone into that.

Senator KERR. You heard the statement by the representative of the engineers here.

Mr. PETERSON. Yes, sir.

Senator KERR. You are familiar in this case, I am sure, or you would not be here representing the budget department in testimony on this case.

Mr. PETERSON. On the basis of the facts contained in this problem, sir, the State was certainly put to considerable inconvenience and probably expense if they proceeded on the basis of the conditions that now exist.

Senator KERR. But conditions involving the national defense?

Mr. PETERSON. Yes, sir.

Senator KERR. Whose responsibility, Mr. Peterson, is it in this country to meet the cost of the national defense?

Mr. PETERSON. Everybody's, sir.

Senator KERR. As implemented through the Federal Government; is that correct?

Mr. PETERSON. As implemented through the Federal Government; yes, sir.

Senator KERR. That is correct; is it not?

Mr. PETERSON. Yes, sir.

Senator KERR. Every State in the Union and all the people in the country and the Territories pay their part of the sum total required for the national defense, and the Federal Government is the instrumentality chosen by the people to meet the responsibility of the national defense; that is right, is it not?

Mr. PETERSON. Yes, sir.

Senator KERR. It was not contemplated by the men who wrote the Constitution and it is not contemplated by the men in the Congress, and it is not contemplated by the men in the executive department that the State of New York or Pennsylvania or Nebraska or Oklahoma or Texas shall be singled out to bear the brunt of the cost of any single item required in the national defense; is it?

Mr. PETERSON. Unless conditions required that to be done, sir.

Senator KERR. Suppose you give me some conditions that would require it.

Mr. PETERSON. I would just have to speculate about any condition where somebody would be forced to suffer because he was not able to do something because of the emergency powers exercised by the Government during the waging of a war. Some people have to pay a greater sacrifice than others.

Senator KERR. I would like for you to give me an instance. I thought that the theme of a democratic form of government was that we had no class legislation and that the responsibilities were borne equally and equitably by all. Is that not your understanding of it?

Mr. PETERSON. Yes, sir; but the application of those conditions might require some areas to suffer more greatly.

Senator KERR. Surely, if one area is bombed, but this area was not bombed. This burden was brought about by action of the Federal Government; was it not?

Mr. PETERSON. It appears so; yes, sir.

Senator KERR. You would be willing to assume for the sake of this discussion that that is correct; would you not?

Mr. PETERSON. Yes, sir.

Senator KERR. Therefore, it would be an unusual burden and might even be an injustice for any individual State, whether it is yours or mine, to bear the cost of a burden created by order of the Federal Government, which it made in carrying out common defense of all of us?

Mr. PETERSON. Yes, sir.

Senator KERR. Therefore, aside from the precedent that you talk about that your lawyers mention, it would seem that there is some moral obligation here, would it not?

Mr. PETERSON. It appears so.

Senator KERR. If this bill is enacted, what the Federal Government will do is build a bridge, will it not?

Mr. PETERSON. I have to check that with the bill, sir. There are several bills.

Senator KERR. I think that is a very wholesome precaution.

Mr. PETERSON. The authorization is for the construction of a bridge; yes, sir.

Senator KERR. By the Federal Government with the States of Texas and Oklahoma making a contribution of $606,000 each?

Mr. PETERSON. I am not sure the bill says that, sir.

Senator KERR. I wonder if you would just read it so that you either be sure that it does or it does not.

Mr. PETERSON (reading):

That the project for construction of a fixed highway bridge across Lake Texoma at or near the Willis site, Denison Reservoir, Red River Basin, Texas and Oklahoma, is hereby authorized: *Provided*, That the States of Texas * * *

Senator KERR. Would you go ahead and read the next paragraph.

Mr. PETERSON (reading):

Provided, That the States of Texas and Oklahoma shall each contribute the sum of $606,00 toward the cost of the work contemplated under this act.

Senator KERR. Would you say generally that the purpose of that act is for the Federal Government to pay for the cost of building a bridge across Lake Texoma at or near the Willis site, Denison Reservoir, Red River Basin, Texas and Oklahoma?

Mr. PETERSON. Yes, sir. My point is that the bill does not actually say who will construct it.

Senator KERR. I think the technicality is well taken, and I do not want to appear critical of your calling attention to technicalities, and will be glad to carry the conversation on in that vein, if it is any gratification or more comfortable for you.

You heard the statement by Mr. Brennan that this liability on the part of the Federal Government was brought about in view of the fact that a bridge across Red River at Woodville was inundated by this lake being built; you heard that, did you not?

Mr. PETERSON. Yes, sir.

Senator KERR. Are you familiar with the law fixing responsibility on the Federal Government in situations of this kind?

Mr. PETERSON. I do not know of any general law, sir.

Senator KERR. I wonder if you would advise yourself first as to whether there is such a law and check on its contents and report back to the committee your findings.

Mr. PETERSON. Yes, sir; I would be glad to.

(There follows the requested information.)

The Bureau of the Budget is not aware of any general law fixing the responsibility of the Federal Government in situations such as those concerning the proposed bridge across Lake Texoma. The law governing highway relocations in connection with Lake Texoma is stated in the Flood Control Act of 1938, which authorized the Denison Dam project, and reads as follows:

"SEC. 2. That section 3 of the Act of June 22, 1936 (Public, Numbered 738, Seventy-fourth Congress), as heretofore amended and as herein further modified, shall apply to all flood control projects, except as otherwise specifically provided by law.

"That in the case of any dam and reservoir project, or channel improvement or channel rectification project for flood control, herein authorized or heretofore authorized by the Act of June 22, 1936 (Public, Numbered 738, Seventy-fourth Congress), as amended, and by the Act of May 15, 1928 (Public, Numbered 391, Seventieth Congress) as amended by the Act of June 15, 1936 (Public, Numbered 678, Seventy-fourth Congress), as amended, title to all lands, easements, and rights-of-way for such project shall be acquired by the United States or by States, political subdivisions thereof or other responsible local agencies and conveyed to the United States, and provisions (a), (b), and (c) of section 3 of said Act of June 22, 1936, shall not apply thereto. Notwithstanding any restrictions, limitations, or requirement of prior consent provided by any other Act, the Sec-

retary of War is hereby authorized and directed to acquire in the name of the United States title to all lands, easements, and rights-of-way necessary for any dam and reservoir project or channel improvement or channel rectification project for flood control, with funds heretofore or hereafter appropriated or made available for such projects, and States, political subdivisions thereof, or other responsible local agencies, shall be granted and reimbursed, from such funds, sums equivalent to actual expenditures deemed reasonable by the Secretary of War and the Chief of Engineers and made by them in acquiring lands, easements, and rights-of-way for any dam and reservoir project, or any channel improvement or channel rectification project for flood control heretofore or herein authorized: *Provided*, That no reimbursement shall be made for any indirect or speculative damages: *Provided, further*, That lands, easements, and rights-of-way shall include lands on which dams, reservoirs, channel improvements, and channel rectifications are located; lands or flowage rights in reservoirs and highway, railway, and utility relocation."

Senator KERR. Would you indulge the assumption with me that the law requires the Federal Government, when it builds one of these projects, to pay for the relocation or the replacement of bridges and highways and railroad facilities and other similar properties?

Mr. PETERSON. It is my understanding, sir, that the authorization to build a project contains all those requirements with it.

Senator KERR. I wonder if you would agree with me that authorizations include provisions to do that because of the requirements of the law that that be done.

Mr. PETERSON. I am not familiar with it.

Senator KERR. You would assume that the only reason the Federal Government would do that would be because it was required by the law; would you not?

Mr. PETERSON. Yes, sir.

Senator KERR. As a member of the President's Budget Bureau, you know that the Federal Government does not spend money without authority or mandate of the law; do you not?

Mr. PETERSON. As far as I know, it does not, sir.

Senator KERR. Would you indulge with me the conclusion that that is a reasonable assumption?

Mr. PETERSON. Yes, sir.

Senator KERR. Then, in view of the fact that this liability arose by reason of inundating a highway bridge, it is reasonable to assume that the Federal Government started off with the primary responsibility of replacing that bridge; is it not?

Mr. PETERSON. Either replacing it or providing for abandonment through probably alternate routes.

Senator KERR. And if an alternate route were agreed upon, the normal assumption would be that the Federal Government would pay for making that alternate route a usable facility; would it not?

Mr. PETERSON. Yes, sir.

Senator KERR. They did pay what they thought was an adequate amount to bring that about; did they not?

Mr. PETERSON. I am sure they did; yes, sir.

Senator KERR. That is your understanding of the history of this case?

Mr. PETERSON. Yes, sir.

Senator KERR. But by reason of facts beyond the control of either party and in fact by reason of an action taken by the Government, in view of what it regarded necessity in connection with this responsibility to win the war, it became impossible for the States to do that

which was contemplated that they would do under the terms of that settlement?

Mr. PETERSON. Yes, sir.

Senator KERR. You are aware that all the States are asking in this proposed legislation is that the Federal Government do that which under the basic law is the usual and customary thing for them to do in the building of such projects as this.

Mr. PETERSON. Yes, sir.

Senator KERR. I believe that is all, Mr. Peterson, and I want to thank you very much for your appearance here. While I think you have been very careful in your statements, I do not censure nor criticize, but do express my deep appreciation for your testimony. Are there any questions?

Senator HRUSKA. Mr. Peterson, if the States had been able to build a bridge for less than the $1,212,000, would they have been under obligation to refund any of the balance to the United States?

Mr. PETERSON. Not from my understanding of the contract, sir.

Senator HRUSKA. Do you know of any other precedent in which this limitation of the War Production Board has been used as a basis to renegotiate contracts which are entirely silent with reference to the happening of that particular eventuality?

Mr. PETERSON. Sir, according to our attorneys and the brief review that was made in preparation for today, we know of no precedent.

Senator HRUSKA. So that if this were put on that basis alone, separate and apart from the equities of the situation—and I realize that there are equities here from the very eloquent testimony given by Congressman Wright—this would be creating a case of first impression—is that your understanding, after the research and study you have made?

Mr. PETERSON. That is the fear of our attorneys.

Senator HRUSKA. Aside from the general reference to this far-reaching effect of such precedent cannot be evaluated at this time—apart from that, have they gone into the matter of making any estimate or any discussion of what might follow as a result of this precedent?

Mr. PETERSON. As they have indicated to me, it would probably be beyond their imagination because this could be extended, such a recognition could be extended.

Senator HRUSKA. Could it extend to the contracts for the procurement material?

Mr. PETERSON. Yes.

Senator HRUSKA. That is all, Mr. Chairman.

Senator KERR. In other words, you take the position, first, that there is some moral obligation here, but that you feel the Government should not meet it because it might be too expensive? That is what this boils down to.

Mr. PETERSON. It might lead to enormous expenditures for cases——

Senator KERR. It might just become too expensive to do right, is that not right?

Mr. PETERSON. The statement——

Senator KERR. That is one interpretation, is it not?

Mr. PETERSON. Of course, it is not always possible—you know better than I would, Senator—for the United States Government to always do what is right for everybody.

Senator KERR. Now you are talking about the far-reaching effect of this precedent being beyond the imagination of the attorneys in the Budget Department, and I want to say frankly that I do not know just how far-reaching their imagination might be, but I am willing to concede that they have at least an average amount of it—I wonder if you would give us for the record after examination of both the Engineers or other Government agencies as to any bridges there might be for which the Federal Government made settlement and the building of which was delayed by action of the Federal Government in making critical materials unavailable and for which claims have been presented to the Corps of Engineers.

Mr. PETERSON. If you would allow me to say so, sir, the Corps of Engineers would have to prepare that because we would not have that information.

(The information requested follows:)

DEPARTMENT OF THE ARMY,
OFFICE OF THE CHIEF OF ENGINEERS,
Washington 25, D. C., May 6, 1955.

Hon. ROBERT S. KERR,
Chairman, Subcommittee on Rivers and Harbors and Flood Control, Committee on Public Works, United States Senate, Washington, D. C.

DEAR MR. CHAIRMAN: During the hearings before your subcommittee on April 21, 1955, on S. 628 and S. 1318, bills to authorize construction of a highway crossing over Lake Texoma, Red River, Tex. and Okla., you requested the representative of the Bureau of the Budget who was testifying on the matter to supply information on bridges for which the Federal Government made settlement and the building of which was delayed by action of the Federal Government in connection with the critical materials shortage of World War II. By letter of April 28, 1955, the Bureau of the Budget requested the Secretary of the Army to request the Corps of Engineers to submit information directly to the subcommittee for insertion in the record. The Corps of Engineers has obtained from its field offices the information summarized below. This information, of course, applies only to Corps of Engineers' projects, since no data is available to the corps on bridges within the category requested which are the concern of other agencies.

The records indicate that there are only two bridges in Corps of Engineers' projects on which settlements were made because of increased costs resulting from the critical materials shortage. These cases, however, are not precisely parallel to the Lake Texoma cases since they involved contracts between the Corps of Engineers and State highway departments for reconstruction of bridges. The work to be undertaken by the State highway departments was delayed by the Corps of Engineers fundamentally because of materials shortage and increased payments were later negotiated by contract modifications. One case was in connection with the Bluestone Reservoir, New River, W. Va., and the bridge involved was on State Route 20. The other case was in connection with the Youghiogheny Reservoir on the Youghiogheny River, Pa., and the bridge was involved in the location of State Route 50.

Sincerely yours,

S. D. STURGIS, JR.,
Major General, United States Army, Chief of Engineers.

Senator KERR. I want to tell you right now that I believe you have that amount of influence that if you asked them to prepare that, I think they would do it.

Mr. PETERSON. Yes, sir.

Senator KERR. Do you have any statement you would like to make, Senator Monroney?

Senator MONRONEY. I do not want to hold up the other witnesses, and I am going to stay anyway.

Senator KERR. I am delighted for you to stay.

Then at this point in the record we will put in the statement which has been filed by Senator Lyndon B. Johnson of Texas.

(The statement of Senator Johnson is as follows:)

The purpose of S. 1318 is to authorize construction of a fixed highway bridge across Lake Texoma at or near the Willis site, Denison Reservoir, provided that the States of Oklahoma and Texas each contribute $606,000 toward the cost of the bridge.

Lake Texoma was created by the construction of Denison Dam, authorized by the Flood Control Act of 1938. Prior to construction of the project, Red River was crossed by a bridge about 10 miles above the dam site and by a ferry near Willis, Okla., about 30 miles above the dam site. Creation of the lake necessitated relocation of highways to maintain services.

By negotiations, the United States and the States of Oklahoma and Texas entered contracts whereby the States would each be paid $606,000 and would grant the United State a perpetual flowage easement over such highways as would be inundated by the reservoir. Payment was made in August 1942, and was on the basis of the estimated cost of contructing a bridge at the Willis site prior to impoundment of water in the reservoir.

The States intended to construct the bridge but could not obtain the steel because of the war conditions.

The House and Senate each adopted resolutions in 1949 and 1950 authorizing an investigation of the matter. The results of the investigation are published in House Document No. 496, 83d Congress. In that report the Board of Engineers for Rivers and Harbors recommended an additional payment of $495,000 to each State to defray the increased cost of the bridge. The Chief of Engineers concurred in that recommendation. Later, due to objections from the Bureau of the Budget, the Chief of Engineers withdrew his recommendation.

I urge that this committee study the merits of this proposal to determine if justification exists for recommending approval of S. 1318 despite the objections voiced by the Bureau of the Budget.

Senator KERR. At this time the committee then will hear Mr. LeRoy Powers.

STATEMENT OF LeROY POWERS, ATTORNEY, OKLAHOMA DEPARTMENT OF HIGHWAYS, ACCOMPANIED BY R. B. ALEXANDER, TEXAS HIGHWAY DEPARTMENT; C. A. STOLDT, DIRECTOR, STATE HIGHWAY DEPARTMENT OF OKLAHOMA; AND CHARLES G. COTTON, MANAGER, HIGHWAY DEPARTMENT, CHAMBER OF COMMERCE, FORT WORTH, TEX.

Mr. POWERS. Mr. Chairman, if the committee please, I have noted from the testimony of preceding witnesses two principal objections, one being the creation or establishment of a precedent for the payment of any additional sums to the States in this case.

I believe that I can give the committee a great distinction between the absence of that in this case and between the absence of those instructions generally. The other matter that was mentioned is that the construction in this case does not require the construction of a bridge; and as I proceed, I think I can clear that matter up to some extent, too.

I am authorized to say that the officials of the States of Oklahoma and Texas are in accord on their views on this matter and have prepared a joint statement, which if the committee wishes, I will follow rather closely, because it is a statement prepared and I have a copy signed by both the Chief Engineer of the Highway Department of Texas and the Director of Highways of Oklahoma.

Senator KERR. That is very fine. Your joint statement will be made a part of the record. You make as much reference to it as you wish.

Mr. POWERS. Thank you, sir.

(The joint statement presented by the States of Oklahoma and Texas is as follows:)

S. 1318, a bill to authorize the construction of a highway crossing over Lake Texoma and Red River, Tex. and Okla., has been introduced in the Senate of the United States, and referred to this committee. The States of Oklahoma and Texas both respectfully urge the committee's favorable action on this bill, and in support thereof make the following statement:

On November 26 and December 6, 1941, the United States of America, through the United States Engineer Office entered into separate agreements with the States of Oklahoma and Texas, respectively, for the relocation of roads and bridges to be inundated by the waters of the Denison Dam. The contracts each provided, among other things, for the payment to each State of the sum of $606,000 upon the conveyance by each State to the United States of perpetual flowage easements over Texas State Highway 91 and Oklahoma State Highway 99, south of Woodville, Okla.

Attached to the agreement, and made a part thereof, were various exhibits describing in detail the roads and bridges to be relocated, and as a part of exhibit B to the contract there is set forth a statement to the effect that the estimated cost of reconstructing the present crossing on Highways 91 and 99 would be $2,100,000.

The exhibit further recites that the Oklahoma Highway Commission and the Texas Highway Commission, in lieu of attempting to reconstruct a crossing at the old site, agreed on an estimate of $1,212,000 for the construction of a crossing at the Willis site, and that both States agreed to accept a cash payment of $1,212,000 to be divided equally between the States, in return for granting of a flowage easement over the Woodville area.

It was contemplated by the States of Texas and Oklahoma and by the Government that with the expenditure of $1,212,000 a new bridge could be constructed at the Willis site, and it is clear from the agreement between the States and the Government that the estimated cost of the immediate construction of the Willis crossing was the basis for the settlement between the States of Oklahoma and Texas and the Government.

The various steps taken by the respective States, both prior to the making of the contracts with the Government and subsequent thereto, clearly show that both States at all times considered a crossing at the Willis site necessary, and at all times contemplated the construction of the crossing.

On September 23, 1941, prior to the execution of the contract, the States of Oklahoma and Texas had requested the Government, by joint resolution signed by both States, to make payment to the States of sufficient funds to rebuild the crossing to be inundated, and specified in the resolution that each State considered the crossing necessary, and agreed that upon such payment to the States, the funds so paid would be utilized jointly and equally by the two States for the construction of said crossing.

Immediately upon execution of the contracts, the State of Oklahoma notified the State of Texas that under an agreement between the two States for the alternating of work on interstate projects, the duty of design and supervision of construction of the Willis Bridge would be the obligation of the State of Texas. To this the State of Texas agreed, and immediately started work on the preparation of plans and specifications for the bridge.

Records of both the Oklahoma Highway Department and the Texas Highway Department disclose that officials of both States promptly undertook to determine the approximate quantities of materials necessary for the construction of the bridge, and that they were assured by the United States Engineer Office at Denison, Tex., that the United States engineers would ask for a priority rating on critical materials necessary for the Denison Dam and bridges being constructed by the United States engineers, and that an attempt would be made to obtain the same or a better priority rating for the Willis bridge as for the other bridges being constructed by the United States engineer.

On March 25, 1942, the Texas Highway Department notified the Oklahoma Highway Department that location and foundation surveys had been completed and sufficient work on the design of the substructure done so that bids could

be taken in June 1942, provided the States had by that time received the money from the Government under the contracts executed in November and December 1941. On April 7, 1942, the district engineer for the United States Engineer Office advised the Texas Highway Department that his office had requested an interpretation from the War Production Board of the priority assistance granted to Denison Dam with reference to its application to the Willis bridge.

For a period of several months there followed on the part of both States efforts to obtain priority ratings for the critical materials necessary to award contracts for the construction of the bridge substructure, and finally on August 11, 1942, the War Production Board advised that it could not grant priority assistance for the necessary critical materials.

Following this action, there was discussion between the officials of the two States, and the district engineer, with reference to the possibility of building part of the substructure with use of substitute materials, which, it was decided, was not practicable, and following an additional request for the War Production Board to review its previous action, which was unsuccessful, the Texas and Oklahoma Highway Commissions, at a joint meeting in August 1943, directed the preparation of revised estimates of the cost of the construction of the bridge. By this time the area had been flooded with water 35 to 45 feet deep and the new estimate prepared by the Texas Highway Department was in the amount of $2,260,768. The highway commissions of both States agreed at that time to present an additional claim to the Government in the amount of $1,048,768, as the difference between the estimated cost of building the structure under water in 1943, and the original estimated cost in 1941.

Pursuant to joint resolution of the two highway commissions, dated October 6, 1943, there was submitted on November 1, 1943, to the district engineer at Denison, Tex., a claim for the total amount of $1,048,768 to be divided between the two States. On January 4, 1944, Col. W. W. Wanamaker, district engineer, replied,stating he felt the claim was without foundation. He was requested to submit the claim to proper authorities in Washington, and shortly thereafter, the claim was denied by the Chief of Engineers. Thereafter, there followed for several years a continuous effort on the part of both States to obtain additional assistance in such an amount as would permit the construction of the bridge.

On September 30, 1952, the Department of the Army, the Board of Engineers of Rivers and Harbors, held a public hearing to review the report of the division engineer made pursuant to resolutions to the United States Senate and House of Representatives, and as a result of such hearing the Board made its report on November 18, 1952, to the Chief of Engineers, Department of the Army. Among other things, the report set forth that the States intended to construct the bridge and had solicited the assistance of the Corps of Engineers to obtain clearance from the War Production Board for acquisition of critical materials; that the States had prepared plans and specifications and estimates, and made earnest efforts to obtain the necessary materials to construct the bridge.

The report concluded by finding that the States, on their own initiative could have constructed the bridge in 1946, after War Production Board regulations were abolished in November 1945. The Board determined that construction costs in 1946 were 1.37 times greater than in 1941, and that for an additional $990,000 the bridge could have been constructed in 1946, and recommended an additional payment in that amount to be divided equally between the States.

The States of Oklahoma and Texas notified the Chief of Engineers that they could not agree to accept, as a final settlement, any sum less than an amount, which, together with payments previously made, would be sufficient to defray the cost of constructing the bridge, and that the additional sum of $990,000 would not be sufficient for such construction.

Both States advised the Chief of Engineers, and the Secretary of the Army that they were unable in 1946 to construct the bridge, and had not been able at any time after the lifting of restrictions on critical materials to construct the bridge, because sufficient funds were not, and had not at any time, been available.

Negotiations for reconsideration of the recommendation of the Board of Engineers for Rivers and Harbors continued, but were to no avail, and the bill now before this committee was introduced to authorize the construction of the bridge.

In connection with the report of the Board of Engineers for Rivers and Harbors, the Bureau of the Budget submitted a report to the Secretary of the Army in which the Assistant Director advised that he knew of no "legal" justication for additional payment to the States of Texas and Oklahoma, further stating that the construction of the bridge was not a condition of the contract, that an

additional payment by the United States, "might be construed as admitting liability for damage caused by the materials priority system established during time of emergency," and therefore declining to recommend any additional payment.

The Chief of Engineers thereupon acceded to the views of the Bureau of the Budget, and withdrew his recommendation for any additional payment.

S. 1318, the bill now before this committee, would authorize the construction of the bridge, provided that the States of Texas and Oklahoma each contributed the sum of $606,000 the sums originally received, toward the cost of the work contemplated.

At the time the contracts were entered into between the States and the Government, the cost paid for the destruction of the existing bridge was based upon the estimated cost of constructing a new bridge between Willis, Okla., and Witesboro Tex., in 1941, and before the flooding of the area.

The estimated cost at this time of constructing a crossing at the Willis site, based upon quantities of materials contained in an estimate prepared by the Texas Highway Department on October 1, 1943, and applying present day unit prices is $7,200,000. The States of Oklahoma and Texas respectfully request this amount less the sums of $606,000 received by each State be made available for the construction of the bridge.

With due respect for the views of the Bureau of the Budget as expressed in the letter referred to, it is contended that the records heretofore referred to clearly show it was the contemplation of both States, and of the Government, at the time the contract was entered into, that the bridge would be constructed.

The objection made by the Bureau, that the payment of any additional sums would be an admission of liability arising out of wartime restrictions, is without foundation for the reason that the liability in this instance rests upon an agreement entered into in good faith, under the terms of which the Government was permitted to inundate a bridge, and to pay therefor a sum then determined sufficient to construct a new bridge. The exhibit to the contract shows positively that the consideration agreed upon was based upon this premise.

The question presented to the War Production Board by the application of the State for a preference rating for materials to construct this bridge was not in any respect similar to the usual application for preference ratings to build other highway facilities.

Both Oklahoma and Texas made many such applications for critical material for many projects. The greater majority of these applications were denied, and the projects for which they were sought were necessarily postponed until after the war. In every instance, the cost of construction had then increased substantially, but no contentions have ever been made by either State that the Government incurred any liability whatsoever because of its denial of preference ratings for materials for these projects.

The distinction in this case is that the War Production Board did grant preference ratings for the materials necessary to construct the Denison Dam. It was known then that the construction of the Denison Dam would result in the destruction of the existing bridge. The contract was entered into for the payment to the States of an amount sufficient to rebuild a bridge at that time.

Obviously, neither State would have considered settling its claim for the destruction of the bridge had it been known that the bridge could not be reconstructed for 5, 10, or 15 years, because the future cost of construction would have been entirely an unknown quantity, except that it was known by all parties to the contract that the cost would immediately increase when the area was flooded.

It was therefore the mutual understanding and intention of the parties at the time the contract was executed, that the bridge would be built promptly, and before 1943, which was the contemplated completion date of the dam.

The War Production Board was requested to grant the preference rating to rebuild a structure which the Government had, in effect, contracted for the States to rebuild, and which would be destroyed by reason of other construction for which the War Production Board had granted preference ratings. Under these circumstances, the War Production Board, as an agency of the Government, was, in the opinion of the States, morally bound to assist, rather than to prevent, the carrying out of the intention of the agreement entered into between the States and another agency of the Government.

At the time the contract was entered into between the States and the Government, it was known that the construction of the Dension Dam would result in the inundation of several bridges located solely within the State of Oklahoma.

The contract between the Government and the State of Oklahoma provided for the reconstruction of these bridges by the United States engineers, and they were so constructed, and preference ratings were granted for the steel to construct these bridges.

In the negotiations leading up to the agreements between the States of Oklahoma and Texas and the Government, it was agreed by all parties that the most practicable solution for the reconstruction of a bridge to replace the crossing involved here, would be for the bridge to be constructed as a joint venture by the two States at the Willis site rather than at the location of the inundated bridge.

There was no difference in the Government's responsibility to the States of Oklahoma and Texas for the replacement of this crossing than for the replacement of other bridges which were solely within the boundaries of one State. Only a different method of replacement was involved. It therefore follows, that the action of the War Production Board in denying the application for priorities for critical materials for this bridge was unreasonable and arbitrary under all the circumstances, and but for such action the bridge would have been built with the funds then available.

At about the same time the War Production Board did make steel available for the construction of a bridge across Red River near Bonham, Tex., notwithstanding the fact that no contractural obligation existed for the construction of this bridge, and notwithstanding the further fact that steel was just as critical at that time as when the application of the States of Oklahoma and Texas for steel for the Willis Bridge was denied.

The Board of Engineers for Rivers and Harbors, in recommending an additional payment, recognized the Government's responsibility, as well as the necessity for the bridge in 1952. Today, traffic counts on all highways in the area are many times greater than they were in 1941, and, with the passage of time, the need for the bridge has become increasingly acute.

The statement of the Bureau of the Budget that no legal ground exists for the making of any additional payment to the States is perhaps correct from a purely legal standpoint. If an adequate remedy at law existed, the same could be enforced in the proper forum, and there would be no need for legislation. The claim of the States is an equitable one, based upon the proposition that the Government should fulfill the obligations which were intended by its agreement with the States.

The United States Supreme Court has many times held that the power of Congress to provide for the payment of the debts of the United States, conferred by section 8 of article 1 of the Constitution, is not restricted to the payment of those debts which are legally binding on the Government, but extends as well to equitable and moral obligations which are not legally enforceable.

The States have fully performed their part of the contract, but they have never received their fully consideration therefor. It is respectfully submitted that Congress should recognize the obligation of the Government, and make provision for the construction of this bridge.

In further support of the claim, and of the statements made herein, there are submitted herewith detailed compilation of documents entitled "History of the Willis Bridge" and compilation of traffic counts on highways in the area involved.

Mr. POWERS. In addition to that joint statement, we have submitted along with it a larger document entitled "History of the Willis Bridge." I will from time to time refer to that, and various documents that were under discussion earlier; for instance, the letter of the Bureau of the Budget that was referred to is contained in that document at page 72, I believe.

The portions of the contract applicable in this case are likewise contained in this history at pages 6 and 7.

Referring to the general statement, I will go briefly into some of the background of the case. One thing that I think is noteworthy in this case is that one of the contracts was entered into, the one with Oklahoma on November 26 and the one with Texas on December 6—that was just a day, of course, before the Pearl Harbor attack—in 1941.

At the time that contract was entered into, certainly neither the States nor the Federal Government anticipated the creation of the situation which developed. It was contemplated by both the Govern-

ment and both States that by the expenditure of the $1,212,000 a new bridge could be constructed at the Willis site.

I say it was contemplated by both the States and the Government and that the construction of that bridge was as much a part of the contract as though it had been written into the contract. I have with me a copy of the contract itself executed by the Government and the States, and I am going to refer to exhibit B to the contract, and that exhibit B is set out on page 7 of that history.

It is just a brief statement showing how the figure of $1,212,000 was reached. The statement says first of all that the estimate for rebuilding the bridge to be inundated, the Woodville Bridge, would be $2,100,000, and that in lieu of rebuilding that bridge, they moved it to the Willis site, which would be about half as costly, and based the settlement figure upon the contract on a bridge at that point.

Throughout the history of this matter, it is evident that there was no question in anybody's mind, no doubt whatsoever on the part of either the Government or the States, that the question involved was the construction of a bridge.

The reason I say that is because immediately the State of Oklahoma advised the State of Texas that under their joint agreement for construction of interstate projects, that it was the turn for Texas to undertake the planning and specifications, and that Texas did and began immediately to plan those specifications.

Thereafter, they were immediately in contact with the United States engineers. They were assured by the United States engineers that the engineering office would make the necessary requests for preference ratings for critical materials; but this was denied by the War Production Board.

Following then in the exhibits herewith, there were letters that went back and forth between the two States and the United States engineers' office. In each of these letters the same general idea follows through consistently, that the engineers would do everything they could to help them build it and that it was a part of the agreement. That is the way we look at the contract, that while the contract was written to contain a flowage easement, that actually written into that contract are all the negotiations leading up to it with reference to the construction of the bridge.

The files and records of both departments are voluminous on this matter, and they contain discussions had even prior to the contract. One is a resolution which I believe we have set forth which—and I will refer to a joint resolution of both highway departments just prior to the agreements—advising the engineers that they would rebuild the bridge, and thereafter the priority requests were made by the engineers, and the letter received from the War Production Board denying that request, addressed not to them but to the engineers.

So that the discussions with reference to rebuilding the bridge at the Willis site rather than the Woodville site, the request of the Army engineers for priority ratings—all those things, we think, are essentially part of this contract, all those things go to establish that the only consideration for signing of this flowage easement was the payment of the $606,000 to each State, but that the actual consideration contemplated was the reconstruction of a bridge at Willis site rather than at the Woodville site.

Senator KERR. The replacement of the facility?

Mr. POWERS. The replacement of the facility, and in that regard, I might say that while normally in the absence of fraud or mistake of fact or circumstances not anticipated, you don't go behind a written instrument and attempt to vary those terms, but in cases where the instrument does not set out the full and complete intention of the parties, certainly you can go into a court of equity and show the background, negotiations, and circumstances there, and show the real intention of the parties.

That is the thing that we are trying to do here today, to show that by all these negotiations. Our files show, the letters show that, and those discussions with the engineers, documents, that first of all the Woodville site would be impractical because too costly; secondly, that this bridge was between the two States and not in either State.

At that point there were other bridges in Oklahoma that were inundated, and which the Army engineers rebuilt themselves under their reconstruction authority. They let the contracts and rebuilt them.

There was no difference whatever, and they do not contend that there was, between their responsibility for rebuilding two other bridges and their responsibility for replacing the Woodville Bridge, but because of its peculiar situation—it being located at a point that would be very costly, it being located between the two States—it was concluded that it would be a simpler and more practicable solution to permit the States themselves as a joint venture to rebuild that bridge, and that is one of the reasons that it was so worked out.

With regard to the contention of the Bureau of the Budget that the payment of any additional sum in this case might establish a far-reaching precedent—excuse me while I refer directly to that language, I do not want to misquote the statement, which is that—

> Further additional payment by the United States in this instance might be construed as admitting liability for damages caused by the materials priority system established during time of emergency and could thus establish a precedent the far-reaching effects of which cannot be evaluated at this time.

We do not believe that that position is well taken here for this reason: both Oklahoma and Texas—and I am sure every other State in the Union—made many requests for priorities for materials to construct other bridges that were simply on their regular programs.

Certainly no State has ever made any contention that it is entitled to any further consideration because of the denial of those requests.

We built lots of bridges after the war that we made requests for before. The cost of it was much greater afterward but they were not being inundated by the Federal Government. Secondly, they were not involved in any contractual agreement between the States and the Federal Government. That is the distinction between the general application of the rule they set out there and the general application of it to our case.

Certainly, I think if they went out and recommended payment simply for increasing costs of construction that might be caused by the denial of preference ratings for materials, certainly that would be creating a precedent and a dangerous one, but where the construction is contemplated and intended by contractual agreement between the States and then by reason of the denial of its preference rating,

it cannot be constructed, then certainly I do not see that that would be establishing any precedent other than the one that is right and fair and equitable.

Senator KERR. Let me ask you a question, and come back to this particular point: the Federal Government itself in the construction of the project was necessarily delayed during the same period of time that the States of Oklahoma and Texas were delayed in this instance; is that right?

Mr. POWERS. Yes, sir.

Senator KERR. Is it not a fact that an accurate analysis of this project and this problem would lead you to the conclusion that the Federal Government is in the same posture here with reference to this facility that it would be on any other project that it might have had to wait until after the critical materials shortage was relieved to build?

Mr. POWERS. I think that is right, sir.

Senator KERR. The contract that was made—and as you said one of them was signed the day before Pearl Harbor—was merely the payment by the Federal Government for the States who were more conveniently situated to fulfill an obligation which was the Government's obligation, is that not correct?

Mr. POWERS. That is right, and not only that but an obligation which was reduced materially by reason of the States agreeing to rebuild the bridge at another location.

Senator KERR. And the fact of that business is that this Denison Dam was rushed to completion because, first, it was a dirt structure, and, second, it was going to provide a great amount of urgently needed power in connection with the war emergency.

Mr. POWERS. That is right. It was a defense project, and incidentally, the engineers—of course, it was necessary for them to obtain different preference ratings from the War Production Board the same as anybody else—obtained preference ratings for the materials for the dam, for the other facilities which they were constructing.

Senator KERR. Powerhouse, turbine?

Mr. POWERS. Yes, and other bridges which they were locating under the same agreement with us, and in connection with that and right along with it, they went right ahead and made requests for preference ratings for the materials to build this bridge, but only the request in connection with this bridge was denied.

Senator KERR. Is it not a fact that actually it was contemplated by the parties that the States of Oklahoma and Texas were merely acting as the agents for the Federal Government in the construction of this bridge?

Mr. POWERS. That would be what it would amount to, yes, sir. It was the obligation of the Federal Government, the engineers. It was their responsibility. It was no different than their responsibility to replace any other destroyed facilities.

Senator KERR. There were railroad bridges across this stream, were there not?

Mr. POWERS. There were railroad bridges and the Roosevelt Bridge and a number of those that were reconstructed. The obligation and responsibilities in this case were no different. The only thing that was different was that a different method was used to replace it.

Senator KERR. To carry out the responsibility of the Federal Government?

Mr. POWERS. That is right, and by reason of that different method, we came to a situation where the States could not, through their joint authority, rebuild the bridge.

Now, I want to go ahead and say this: that at the time, in 1941, of the construction, the construction cost estimate for that bridge at Willis site was $1,212,000.

Now, in 1955, the estimated construction cost for that bridge, using the same unit quantities, based on an estimate made by Texas in 1943 after the area was inundated, by applying present-day prices, was $7,200,000.

Another thing is this was mentioned by one of the witnesses, the bill S. 1318 authorizes the construction of a bridge between States—oh, I believe it does not say by whom—it authorizes the construction of the bridge upon the payment by the States of $606,000 each, which is proper.

With regard to the actual construction or who would perform the work on the bridge, both the highway departments of the State of Texas and the State of Oklahoma have discussed that matter and are in agreement that they would continue to accept that responsibility.

They feel they could do it more economically. They still have all the work that has been put into the plans and specifications and soundings and surveys and all that has already been done; so if the money were made available, then the States could construct the bridge.

One other thing with reference to the recommendation of the engineers of the Board of Rivers and Harbors, in 1952 they said the States should be paid $990,000 additional. As Mr. Brennan said they arrived at that amount by concluding that the bridge could have been built in 1946, and they used the 1941 prices increased them by 1.3 percent, and then deducted 3 percent interest on the money that we had received and concluded that the States were entitled to an additional $990,000.

Had the States had ample money available in 1946, perhaps they could have constructed the bridge, but the States of Oklahoma and Texas did not have that money available, and you cannot take a million dollars or so out of your regular program and apply it to some particular facility without disrupting an entire highway program for some considerable period of time.

The Government never made that money available to the States, and thus in 1946, theoretically the bridge perhaps could have been built for that amount of money.

Senator KERR. In order for the Government to say that they have fulfilled their liability, they would have to show at that time that they had made that additional money available to the States, would they not?

Mr. POWERS. Yes.

Senator KERR. And here 14 years has passed and the transportation facility has not yet been replaced.

Mr. POWERS. That is right; the facility has not. The need for the bridge has become increasingly acute as the years have gone by. We have supplied, along with our statements here, another document giving traffic conditions on the various highways in this area and the traffic conditions on the other bridges.

Bear in mind it is quite some distance between the bridge on Highway 77 to the west and the bridge on Highways 69 and 75 south of Durant. That leaves a rather broad expanse in there.

As the Congressman from Texas testified, a crossing at this point would open up traffic to the entire northern area of Texas and to the central part of Oklahoma.

Traffic conditions show that in 1948 the bridge at Marietta was carrying 2,228 cars a day; in 1954, 3,662.

The one south of Durant likewise increased from 4,386 to 5,904 cars per day. That is a great amount of daily traffic over those bridges.

Our statistical department, on the basis not only of those traffic conditions, but also on the basis of traffic conditions on all of the adjoining highways, has concluded that approximately 3,500 vehicles per day would use this crossing at the present time and that by 1965 an estimated 5,740 vehicles a day would use the crossing.

If I may say one thing for the bill, it is simply this: that a contract was made here which was intended to be a valid and binding contract for the replacement of that facility.

The State of Oklahoma and the State of Texas each performed fully their obligations. They executed the necessary flowage easements for the Government to construct its dam. The States feel that the consideration for the contract has not been fully paid.

Senator KERR. Thank you very much, Mr. Powers. Are there any questions?

Senator HRUSKA. I did have some, Mr. Chairman. First of all, I want to say that I think you have made a very clear statement of a difficult situation, and as one who has been in the law system for a long time, I always appreciate it when a clear and logical statement of that kind is made.

I think you have made a very fine contribution. I am wondering, Mr. Powers, suppose along about in December or January of 1941 or 1942, respectively, the States of Texas and Oklahoma had entered into a contract with a private bridge building company, and that company had posted a performance bond, and they agreed to build that bridge for $1,200,000, the contract being entirely silent with reference to war conditions or anything else, and then these War Production Board restrictions would intervene, making it impossible to construct that bridge until in 1946 or 1947, at which time it would have taken $3 million or $4 million to have built that bridge.

Would there be any disposition, or would there likely have been any disposition on the part of Texas and Oklahoma Highway Departments to say, well, that is fine, we will simply waive that, we will pay that difference? Do you suppose that would have been true?

Mr. POWERS. I think not, sir. Of course, impossibility performance is one of the grounds on which a contract may be rescinded.

Senator KERR. Will the witness bear in mind that in the meantime the lake was inundated?

Mr. POWERS. But in the meantime the lake was inundated, and this case may differ somewhat in that to make it comparable to the specific case you are giving, the contractor himself would have had to create the condition which prevented his carrying out his contract.

Certainly, under those conditions we would not have relieved him from his obligation.

Senator HRUSKA. Perhaps so, but, of course, the circumstances leading to the impossibility of performance here were not self-invited by the Federal Government, were they? They were an external force and by reason of external circumstances. You will agree such are not provided for in the contract, will you not?

After all, we might say that right there actually is equity and maybe we might be disposed to. Remember the Bureau of the Budget is not saying we are not going to do so because it would cost too much.

On the other hand, they are creatures of law just like your Texas and Oklahoma Highway Department, and having executed it, then you would not be in a position to add to it without legislation from your respective legislatures; they would have no power to do it whether they wanted to or not, would they?

Mr. POWERS. I think that is right, sir; but bear this in mind, that an agency of the Government, the War Production Board, had before it the request for the preference ratings for these critical materials.

I am not saying that that agency did not do what it felt was absolutely necessary and right to do under the circumstances; but that was an agency of the same Government that contracted with the States. That was an agency of the same Government as the engineers who were requesting the preference rating for materials.

My feeling is that the War Production Board was morally bound to assist rather than prevent the fulfillment of this contract. In that respect I might further say that there were other bridges in the area, for which preference ratings were granted.

There was one other bridge in the area called the Bonn Bridge, which was not involved in this contract at all, but preference ratings were granted for it.

Again, I am not quarreling with the decisions on the matter, but I am merely pointing out that that steel was just as critical as the steel which was denied for this bridge. The steel for the bridges that the engineers built in that area was no more critical than the steel for the Willis Bridge.

It was an administrative interpretation of the War Production Board, as I say, an agency of the same Government that contracted with us to build the bridge and an agency of the same Government, who were trying to assist us to get the preference rating.

Senator HRUSKA. I do not want to get into the position of prejudging this thing, and I can see in your argument where you say what was in the contemplation of the parties was entirely different to what was actually reduced to print, and I think your explanation of that was very good; but we get into the equities of the situation and I do not know that the Bureau of the Budget would be permitted to get into the equities.

I think that would be pretty much upon the legislature. If any relief is to be given, I would think it would be by legislative action. That is the only way.

Senator KERR. That is the only way it can be.

Mr. POWERS. I think that is right. If we had an adequate remedy at law——

Senator HRUSKA. Or even an equity to take to an equity court. You have not even those available to you.

Mr. POWERS. I think the Bureau of the Budget when they said there is no legal way they can pay it, I believe they use that term, and

I believe that is correct; but our Supreme Court, I believe, has held that the power of Congress to pay its debt is not limited to those which are strictly enforceable, but includes moral and equitable obligations.

Senator HRUSKA. Again I want to say, Mr. Powers, you have made a very powerful statement.

Senator KERR. Again I want to ask you a question based on a question posed by my good friend from Nebraska. He said suppose a contract had been made with a private contractor to build this bridge prior to the development of the war emergency and prior to the Government's order creating the priority system, which made the material unavailable.

Then would the State later have relieved the contractor on his obligation to perform, or would they have reimbursed him for the extra cost by reason of its actions.

Suppose in formulating your answer to that question, in order to make it identical to this, I think you would have to suppose in addition to that, first, that the State had inundated the area where the bridge was to be built, thereby making it impossible for the contractor to carry out their contract; and second, that the State itself had issued an order making it impossible for the contractor to get the material with which to build the bridge.

If those two elements had been present, a part of this contract between the highway department and a contractor, is there the slightest doubt in your mind that the highway department would have sought to compel the performance of that contract under its performance bond on the basis of the figures contained in the contract?

Mr. POWERS. No, sir; I would think not.

Senator KERR. I do not believe it is in the mind of the Senator either.

Senator HRUSKA. Not in that respect, but the inundation of that land would simply be a factor to mitigate the excess of cost. If the delay in time is due, if the increase in cost is due simply to the delay occasioned by the War Production Board restrictions then I would say the departments of Texas and Oklahoma would not pay that additional cost.

If it were actions of their own, like the flooding of that land, which would result in increased cost, that would be something else.

If they were in charge of that, that is. Of course, if they were not in charge, that would be different.

Senator KERR. One of the parties to this contract was in charge of it. The Army engineers themselves were in charge of that.

Senator HRUSKA. That is right; to that extent yes; but as I understand it, the increased cost here that you are asking for is a sum of factors, not only the amounts of the land in a situation where it was contemplated that the bridge would be built on dry land but you are asking for the entire cost of the bridge at the present prices, present size, present everything less the $606,000, is that not right?

Mr. POWERS. That is right, sir. We think that the contract contemplated the replacement of a crossing which we have never gotten and to which we feel we are entitled; and if it goes on 10 more years and costs $10 million at that time, that is what we would ask for.

Senator KERR. In other words, if the Government had the responsibility to replace the facility at the time, and it was not done because

of action of the Government itself, it cannot now hide behind the technicality of a contract it made with the States to replace it in view of the fact that the Government itself made it impossible for the State to carry out that contract.

Mr. POWERS. That is exactly it.

Senator HRUSKA. Of course, we would not want to get too far away from the contract. The contract does not require that the bridge be replaced. In the light explained by Mr. Powers, that was the understanding, but the contract does not require the bridge to be built.

Senator KERR. That is the testimony of both parties. That is the testimony of the Army engineers.

Senator HRUSKA. That it requires the construction of the bridge?

Senator KERR. Replacement, that the contract was an instrumentality to meet the Government's responsibility for the replacement of the facility.

Senator HRUSKA. I did not understand Mr. Brennan to testify that way.

Senator KERR. That is the way I understand it.

Mr. POWERS. I think that the exhibit to the contract which says the means by which the payment was arrived at——

Senator HRUSKA. You are talking now about what is in the contemplation of the parties. I am talking about the contract which was executed, and that plainly says—I do not think you can derive anything else—but what there is no obligation to rebuild that bridge or construct a bridge.

Mr. POWERS. The contract simply says for a flowage easement, and it states how it was arrived at.

Senator HRUSKA. The flowage easement and the destruction of the original bridge. It says nothing about rebuilding the bridge. What was in their minds is something else again, but the contract itself does not provide for the rebuilding of the bridge.

Senator KERR. The contract is an instrumentality, Senator, to meet the law. It is assumed that the law was in the minds of the contracting parties, I presume. Certainly the Congress is aware of the law under which these parties were operating and the responsibility of the Federal Government was fixed by the law, and the law was to replace the facility; and the contract was a vehicle whereby they were meeting that responsibility.

They did not change the law by entering into the contract. They were fulfilling the law. They were meeting the requirements of the law, and when by their action they made it impossible to carry out the contract, they could not do otherwise than to revert to the posture of fulfilling or carrying out the responsibility of the law which they had sought to discharge by the contract.

Mr. POWERS. May I make one further statement for Senator Hruska?

Senator KERR. Yes.

Mr. POWERS. The contract does contain a provision granting to the States a right-of-way across the lake at the Willis site, which, I think, indicates that a bridge was to be built there.

62536—55——21

Senator HRUSKA. I think that it bears on your argument with reference to the subject matter in the contemplation of the parties at that time.

Mr. POWERS That is right.

Senator KERR. Thank you very much, Mr. Powers. I want to join Senator Hruska in congratulating you on your very fine statement.

Mr. Alexander, of the Texas Highway Department.

Mr. POWERS. Thank you for permitting me to appear, Mr. Chairman.

Mr. ALEXANDER. I am Randall Alexander, bridge engineer for the Texas Highway Department.

Senator KERR. You may enter your prepared statement.

Mr. ALEXANDER. I have no prepared statement, sir. I want to join the Senators in commending the previous witness' statement. The engineer is a little bit hard to please with a statement on engineering matters, and I may say that Mr. Powers has certainly pleased this engineer.

I am authorized to say to you that the Texas Highway Department, by proper minute, indicated its willingness to join with Oklahoma in building this crossing when and if the funds are appropriated.

I think the record has clearly shown that a crossing was contemplated, and to repeat myself, if the money is appropriated, we stand ready to meet our part of the cost.

I should be glad to answer any questions that the committee may have.

Senator KERR. I understand you appear here and your statements are in support of the bill; is that correct?

Mr. ALEXANDER. Yes, sir.

Senator KERR. I have no questions unless the Senator does.

Senator HRUSKA. No, thank you, Mr. Chairman.

Senator KERR. We will hear from C. A. Stoldt, director of the State Highway Department of Oklahoma at this time.

Mr. STOLDT. Mr. Chairman, unless there are questions, I think that Mr. Powers has set the case out very well for the Oklahoma State Highway Department, so if there are no questions, I will make no statement.

Senator KERR. Do you have a statement that you have prepared?

Mr. STOLDT. No, sir; he has submitted the joint statement by Texas and Oklahoma.

Senator KERR. You have here a booklet from Oklahoma Department of Highways with some traffic exhibits.

Mr. STOLDT. That is right.

Senator KERR. Would you like for that to be made a part of our record?

Mr. STOLDT. Yes, sir.

Senator KERR. It will be.

(The above-mentioned document is as follows:)

STATE OF OKLAHOMA DEPARTMENT OF HIGHWAYS

In connection with the contemplated construction of a bridge crossing over Lake Texoma at the Willis site, Denison Reservoir, Red River Basin, between Oklahoma and Texas, an analysis of available traffic data was made to provide basic information relative to the vehicular volumes anticipated at this location.

The department of statistics of the Oklahoma Highway Department, to obtain the desired information, directs attention to specific factors that would influence the traffic volume at this location.

1. Lake Texoma is annually attracting thousands of sportsmen and visitors who not only need, but are properly entitled to, access to both Oklahoma and Texas shores of the lake, without traveling some 65 to 85 miles via the only existing routes.

2. The construction of the bridge will serve considerable interstate traffic between Texas and Oklahoma which could be convenienced by a north and south road bisecting U. S. 66 and the Turner Turnpike at a point in the vicinity of Chandler, Okla.

3. The traffic congestion now apparent at the two river crossings on U. S. 77, south of Ardmore and U. S. 69 and 75, south of Durant, would be greatly alleviated by the construction of another crossing. During 1954, 3,491,590 vehicles were tabulated crossing the 2 bridges.

4. Local traffic in the area, would be convenienced, by furnishing an all-weather road between Madill, Okla., and Whitesboro, Tex.

5. Traffic now using existing facilities would be attracted to a new location.

6. To provide factual basis for assignment of traffic to the proposed bridge crossing at the Willis site, origin and destination studies were analyzed to provide information relative to the traffic volume anticipated at the following sites: Durant, Ardmore, Ada, and Shawnee, Okla., and Sherman and Denison, Tex.

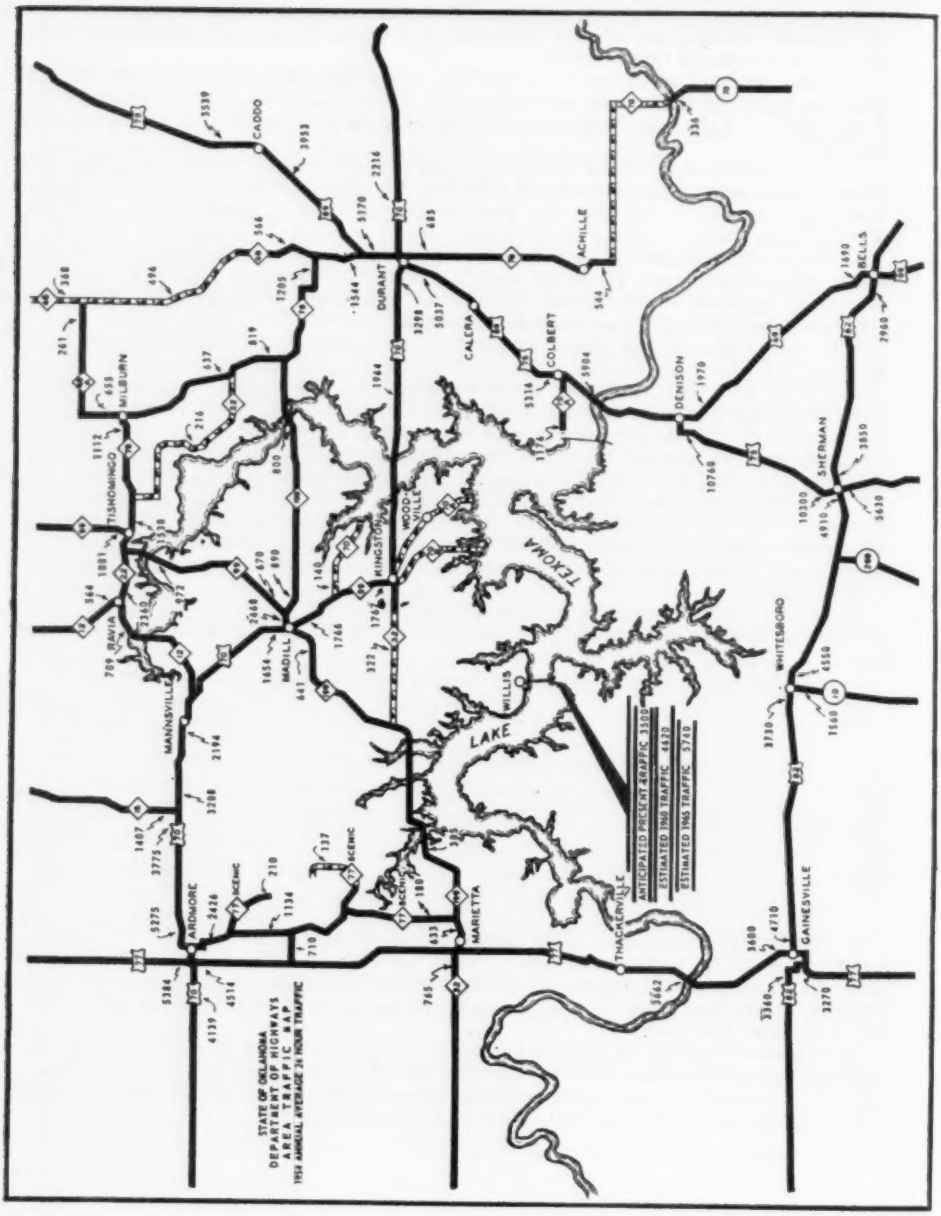
7. The Oklahoma and Texas State Highway Departments have, for a number of years compiled the annual daily average traffic on all the principal highways. The most important use of the traffic-volume data is in establishing the relative importance of the highway network and as a factor in the assignment of traffic to a new location.

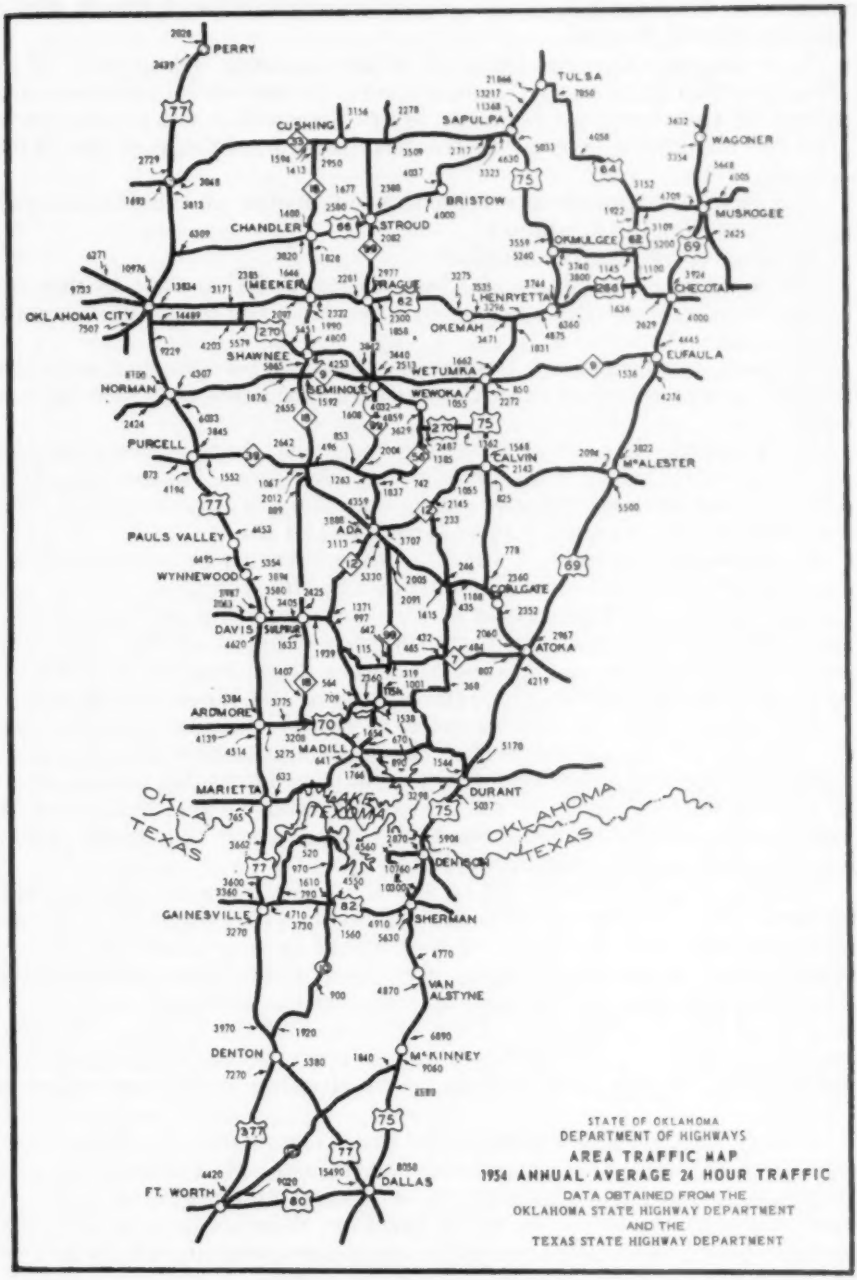
8. The following tabulation shows the daily average traffic for the years 1948 to 1954 at the bridges crossing the Red River on U. S. 77, south of Marietta, and U. S. 69 and 75, south of Durant.

Year	U. S. 77 south of Marietta	U. S. 69 and 75 south of Durant
1948	2,228	4,386
1949	2,986	3,770
1950	3,388	4,101
1951	3,034	4,385
1952	3,350	4,582
1953	3,331	5,051
1954	3,662	5,904

9. The bridge crossing on Red River, south of Marietta, on U. S. 77, shows an increase of 64.4 percent in the 7-year period; and the bridge crossing on Red River, south of Durant, on U. S. 69 and 75, shows an increase of 34.6 percent. Both locations showed a combined increase of 44.6 percent, or a gain of 6.4 percent, per year.

After careful study of all the traffic data available, we are of the opinion that approximately 3,500 vehicles per day would be benefited by the new bridge. Also, it is estimated that 4,620 vehicles, per day, would use the bridge in 1960, and an estimated traffic of 5,740 vehicles per day, by 1965.


CADDO
DURANT
ACHILLE
CALERA
COLBERT
DENISON
SHERMAN
BELLS
WILBURN
TISHOMINGO
MANNSVILLE
MADILL
KINGSTON
WOODVILLE
ARDMORE
MARIETTA
THACKERVILLE
GAINESVILLE
WHITESBORO
LAKE TEXOMA
LAKE WILLIS
SCENIC
ANTICIPATED PRESENT 24 HR TRAFFIC 3300
ESTIMATED 1960 TRAFFIC 4620
ESTIMATED 1965 TRAFFIC 5720
STATE OF OKLAHOMA
DEPARTMENT OF HIGHWAYS
AREA TRAFFIC MAP
1951 ANNUAL AVERAGE 24 HOUR TRAFFIC



Senator KERR. At this time the committee will hear Mr. Charles G. Cotton.

Mr. COTTON. Senator Kerr and gentlemen of the committee, as the Senator has just said, my name is Charles G. Cotton. I am manager of the highway department and the territorial relations committee of the Chamber of Commerce of Fort Worth. I have occupied that posi-

tion since July 1, 1928, except about 40 months when I was in service during World War II.

It so happens that the interests of the highway department of the Fort Worth Chamber of Commerce and the territorial relations committee of the chamber of commerce are identical in the city's interest and the chamber's interest in the building of a bridge at the Willis site.

We have an appropriation on the old bridge at the Highway 91 and 99 site over in Oklahoma.

Senator KERR. At Woodville?

Mr. COTTON. Yes, sir; and when we learned that that bridge was going to be destroyed we began an interest in the proposed bridge at Willis site.

It stems, you might say, because we think we recognize an area that should be better served than the existing roads are now serving that area.

On the roads that are now serving that area, there is a combination of 77 on south through Oklahoma City, Ardmore, Gainesville, Tex., Denton, and Fort Worth, and the combination 377 coming off at Denton and extending through Fort Worth to Del Rio.

On the east we have Highway 75 coming through Tulsa and to Denison and to Dallas and on to the southeast to Houston.

Then you have Highway 69 at Denison extending over toward the northeast to McAlester on to the points up north of that, and that whole area that lies in Oklahoma between those two roads is wholly without adequate service, since the closing of the Woodville Bridge.

We believe that a bridge crossing at the Willis site would tend to serve many of the interests that lie in that area and interests have been magnified by construction of the Turner Turnpike, because there is a great deal of traffic to that area now, and we feel that much of that traffic will flow south from that turnpike and that traffic would be there if there were a bridge at the Willis site.

I might digress a little bit to say that very soon we are to build between Fort Worth and Dallas a toll road. There are some private interests who want to do it. There would be one in the vicinity of Gainesville. I have a communication from one of those gentlemen of that company who are thinking in terms of the northern terminus of that road being at the foot of the south end of the bridge. We will say from Waco to Whitesboro. That road would go through the Dallas-Fort Worth area and down to Houston or perhaps Corpus Christi.

There is another agency interested in that same idea but from Waco or Austin and San Antonio; so we visualize not only the need that has needed to be met through the years, but a need which is becoming more acute through the years; so we of the Fort Worth Chamber of Commerce would like to go on record as urging construction of the bridge at the Willis site.

Senator KERR. Thank you, Mr. Cotton. As I understand you, you have told us two things: that the Woodville Bridge which was in operation prior to the construction of this lake served as a traffic facility of great usefulness to a large area and a large number of people.

Mr. COTTON. It did, sir.

Senator KERR. That the need for a facility either at Woodville or to replace it, has grown increasingly in the time since it was inundated.

Mr. COTTON. Yes, Senator, may I add there that I think their interest has been keener in the possibilities of a bridge at the Willis site than possibly their interest would have remained in the old bridge, had it not become inundated.

I will tell you why. The highways in the State of Oklahoma—those of us who are familiar with the map of Oklahoma recognize how Highway 75 coming out of Tulsa winds in and out—going from Fort Worth to Tulsa there is simply not a good route. You have got to travel at least 25 to 30 miles out of the way between the Tulsa-Kansas City area if you want to make a trip of that kind.

We believe that if we had a bridge at the Willis site that the Highway Departments of the State of Oklahoma and the State of Texas would immediately begin to construct many roads that would lead to that site, and it is our belief that a reasonably direct route from Tulsa to the bridge with reasonably direct connections would be built and would connect Fort Worth and Dallas and shorten the distance a great deal. We feel it would certainly shorten the distance between Fort Worth and Tulsa by at least 75 miles or maybe more.

The bridge at the Willis site would be the means for a relief of the acute traveling problem today.

Senator KERR. In other words, it will be a replacement of the bridge that was at Woodville, and that would include a shortening of routes and increase the desirability of the routes and that it would be far more widely used even than the Woodville Bridge had been prior to its inundation?

Mr. COTTON. We believe that; yes, sir.

Senator KERR. Thank you very much, sir. Are there any questions?

Senator HRUSKA. No.

Senator KERR. All right, sir, we will excuse you.

Mr. COTTON. Senator, I do appreciate this privilege of appearing before the committee.

Senator KERR. Senator Monroney.

STATEMENT OF HON. A. S. MIKE MONRONEY, A UNITED STATES SENATOR FROM THE STATE OF OKLAHOMA

Senator MONRONEY. Mr. Chairman and members of the committee, I want to express my appreciation for the thorough and complete hearings you have given to this bill, and to concur completely with the statement made by Mr. Powers and other representatives here.

This building of this facility has been delayed for some 14 years due to no fault of the State of Texas, due to no fault of the State of Oklahoma.

The facility, I feel, was pledged to the States of Oklahoma and Texas in exchange for the inundation of tens of thousands of acres of our land for the construction of a flood and power dam that was located within the territories of the two States.

Had it not been for the interjection of this Federal authority and project between the two States, Oklahoma would not be here today, along with the State of Texas, requesting the replacement of an existing facility that was serving thousands of cars a day in ordinary interstate transportation between these two areas.

When you look on the map, you will note that the Federal facility of Denison Dam produces a Chinese wall of some 65 to 75 miles, under which the normal traffic between these two prosperous areas of the State of Oklahoma and the State of Texas cannot have their normal intercourse.

Certainly it was the feeling of the junior Senator from Oklahoma and other members of the Oklahoma delegation that the essential vital transportation facilities of the State, as well as the privately owned railroads and utilities would be, as the representative of the Budget Bureau testified made whole by the Army engineers in the construction of this project.

We could build, if it were not for the presence of this dam, some 5 or 6 highway bridges between Oklahoma and Texas at a cost of less than present cost of constructing this one bridge at Willis will entail.

In order to be helpful to the Federal Government, the States of Oklahoma and Texas joined together, as a convenience to the Federal Government; to prevent undue delay or difficulties in negotiation with the two States, they agreed to do this work of replacing this facility.

It is true that a contract was entered into, but this contract was solely and strictly based on the replacement of this facility and did not in its moral effect eliminate the Government's responsibility for replacing the bridge that then existed at Woodville.

I think it would be completely fallacious reasoning to now assert in 1955, 14 years after you are working on this dam, and the inundating of this site which alone raised the cost by more than $700,000 in the construction of the piers on this project, that the Federal Government has discharged its responsibility.

That is the purpose of this bill that the senior Senator from Oklahoma and the junior Senator from Oklahoma have introduced, and is being heard now.

It is customary and it is well known that Congress has within its power in the passage of such bills as this, the right to assert the moral obligations of the Federal Government, the circumstances that damage States or even private individuals when Government facilities are installed.

Certainly I do not look on this bill as it is now prepared and presented before this committee as establishing any precedent in which cities or private persons could lay claim against the Government for rising costs that were occasioned by the priorities of steel or other materials during the war that were placed on this by the War Production board.

Certainly the thing at issue was the construction of a highway facility for which the State of Texas and Oklahoma at the convenience of the Government itself, agreed to change the location from Woodville to 20 miles upstream to lower the essential cost of this and to build into this bridge other highway facilities at lower expense to permit the replacement of this crossing.

If the Federal Government chooses to hide behind the strict interpretation of a contract, granting flowage rights, then I feel it is taking a policy that is grossly unfair to two sovereign States and is grossly unfair to the theory that dealing with the Federal Government

you have no recourse beyond the four corners of what they signed, the contract.

Certainly, this bill which would authorize the construction of this dam shows the case at point here is simple and plain to understand; and if the Congress passes this bill authorizing the construction of this dam and the appropriation of the sums to build it, we will then be really replacing the facility that then existed, reestablishing the intercourse between the two States, and the Federal Government will be in exactly the same position as it was when it undertook the construction of this dam.

Oklahoma and Texas have lost a lot of money during these 14 years in the free flow of traffic and the land, for instance, and other things entailed by that interruption of normal transportation.

It would seem to me that the statement of Mr. Powers and the distinguished chairman of this committee and others that have expressed themselves clearly shows that it is the responsibility clearly of the Federal Government to make the States whole; and the only way that it could be done is to provide for the authorization of this bridge and to get underway with the appropriations for the construction of it.

If they choose to build it themselves, if the Army engineers do it, that is all right with me; if they choose for the convenience of the Government, which I feel sure they perhaps would, to accept the technical help and the reduction of the expense of this to let the State Highway Departments of Texas and Oklahoma build it, then that is their business.

But we are entitled to a bridge; we are entitled to replace the facilities that were inundated, and the presence of the Federal Government between these two States with this facility clearly, morally maybe, has an obligation to replace that no matter how much we are concerned about technicalities in precedents of the War Production Board on withholding priorities from that bridge.

I feel that both of the States have been extremely cooperative and this cooperation should be recognized by the passage of this bill, and I feel sure that this committee will favorably consider it.

Thank you.

Senator KERR. Thank you very much, Senator Monroney, for the very able and just statement. Are there any questions, Senator Hruska?

Senator HRUSKA. Just this: Would there be any objection, Senator Monroney, to making some allowance for interest? After all, if equity is asked, I suppose equity ought to be given in some form for the use of this money for the 14 years.

Senator MONRONEY. I would feel that the expense that the State has gone through by the lack of this bridge, the inconvenience to the people of the lack of use of the facility, which was not constructed, through no fault of the States, but rather by actions of the Federal Government, would offset the interest component in this amount.

I think it could be well shown that over the 14 years that this bridge didn't exist the State lost more than the interest component would be. I think that loss then would just about offset the interest to be gained.

Senator HRUSHA. Mr. Chairman, before these hearings are concluded on these bills, could we have an estimate of the cost of construction of this bridge now?

Senator KERR. I think it is in this joint statement filed from the two States, is it not, Mr. Powers?

Mr. POWERS. Yes; it is in the amount now of $7,200,000.

Senator KERR. It is found on page 77 of this larger statement. Is that referred to in this joint statement, Mr. Powers? Oh, yes, I see it is in here on page 6.

Mr. POWERS. I might say this, sir; after I get back, we will submit detailed estimates.

Senator KERR. Would you submit us a detailed estimate and would the Corps of Engineers join in that effort too?

Mr. BRENNAN. Yes, sir.

Senator HRUSKA. In making that request, Mr. Chairman, I am sure we are anticipating questions which will be asked in the committee at large.

Senator KERR. Yes, and I think it is very well that we do that.

There being nothing further, we will adjourn until tomorrow morning at 10 o'clock at which time we will take up S. 890 the pollution bill.

(There follows the requested estimates:)

STATE OF OKLAHOMA,
DEPARTMENT OF HIGHWAYS,
Oklahoma City, Okla., May 11, 1955.

Hon. ROBERT S. KERR,
Chairman, Subcommittee on Flood Control, Rivers and Harbors, Committee on Public Works, Senate Office Building, Washington, D. C.
(Attention: Mr. Don McBride.)

DEAR SIR: Pursuant to the request of the committee at the hearing on S. 1318 of April 21, we enclose 20 copies of an estimate of cost of the proposed bridge across Lake Texoma between Willis, Okla., and Whitesboro, Tex.

You will note, that this estimate is in the amount of $6 million as compared to the preliminary estimate given the committee at the hearing of $7,200,000. This reduction in estimated cost has resulted from a change in design and is more fully explained in the enclosed letter from D. I. McCullough, bridge engineer for the Oklahoma State Highway Department to C. A. Stoldt, State highway director.

Very truly yours,

LEROY POWERS, *Attorney.*

OKLAHOMA STATE HIGHWAY DEPARTMENT,
May 11, 1955.

To: C. A. Stoldt.
From: D. I. McCullough.
Subject: Proposed bridge across Denison Lake between Willis, Marshall County, Okla., and Whitesboro, Grayson County, Tex.

As per your instructions I contacted Randle B. Alexander, bridge engineer for the Texas Highway Department and requested him to make a new preliminary estimate for the Willis Bridge in line with the latest design and anticipated present day prices. As also discussed with you, Mr. Alexander, and myself, have agreed to make the new estimate based on a deck-plate-girder bridge which will be more economical as well as a much better looking bridge.

You will note that we have reduced the total estimate for the bridge with 28 feet roadway and two 18 inch curbs, H–20 loading from $7,200,000 to $6 million. You will also note that we have reduced the estimated cost for both the substructure and superstructure. The reduction in the cost of the superstructure is due to changing from a high through truss design to the deck-plate-girder design. The reduction in the substructure is due to changing the type of pier construction. The revised pier design is based on carrying the concrete pier columns to the bottom of the lake only with steel piling driven to solid foundation below the pier bases. This design is also based on using either steel cylinders or sheet piling in placing the concrete pier bottoms below the lake level, with

a concrete seal poured under water and the remainder of the concrete placed in the dry. This will eliminate the possible use of air and reduce the cost of the substructure accordingly. You will note that all cost of the class A concrete in the pier columns design is included in the price shown with no additional quantities for the steel cylinders, sheeting or unclassified excavation.

Although the enclosed estimate was originally made by Mr. Alexander our department have checked through the design and after backchecking with Mr. Alexander have made a few revisions. Both Mr. Alexander and myself believe that the new bridge can be built for the above estimate although we realize that the substructure will be constructed in 30 to 60 feet of water and the superstructure will probably have to be erected from barges. This means that individual contractors will have to work out their own methods and therefore their prices may vary somewhat from the ones on the estimate as well as a possible increase in general prices within the next 6 months to a year which will probably elapse before the bridge can be let to contract.

D. I. McCULLOUGH, *Bridge Engineer.*

ESTIMATE OF COST, PROPOSED BRIDGE ACROSS DENISON LAKE BETWEEN WILLIS, OKLA., AND WHITESBORO, TEX.

Bridge.—Station 143+61 to station 196+43; length, 5,282 feet. Low steel elevation 642, roadway grade elevation about 653, 28-foot roadway, reinforced concrete floor. Concrete bent substructure resting on steel foundation piling seated in shale. Design loading H–20 in accordance with AASHO specifications.

Approaches.—No earthwork is included in this estimate. Riprap for the protection of bridge embankment slopes is included as part of the bridge cost.

Superstructure.—24 spans at 220 feet equal 5,280 feet (six continuous plate girder units, each with 4 spans at 220 feet).

Class AA concrete-floor, 3,700 cubic yards at $60	$222,000
Reinforcing steel, 780,000 pounds at 12 cents	93,600
Structural steel, 10,400,000 pounds at 18 cents	1,872,000
Total	2,187,600

Substructure.—23 piers with steel foundation piling, 2 abutment bents with steel piling.

Class A concrete, 21,500 cubic yards at $90	$1,935,000
Reinforcing steel, 3,700,000 pounds at 12 cents	444,000
Steel H piling, 60,000 linear feet at $12	720,000
Riprap (stone), 15,000 cubic yards at $10	150,000
Riprap (cushion), 5,000 cubic yards at $4	20,000
Total	3,269,000
Total superstructure and substructure	5,456,600
Approximately 10 percent engineering and contingencies	543,400
Grand total	6,000,000

(Thereupon, at 12:40 p. m., the committee was adjourned to reconvene Friday, April 22, 1955, at 10 a. m., at the same place.)